

# **GROUND BEETLES (CARABIDAE) OF FENNOSCANDIA**

---

**A Zoogeographic Study**

---

**Part I**  
**Specific Knowledge  
Regarding the Species**

**CARL H. LINDROTH**

---



This is the first part of the three-part monographic study *Ground Beetles (Carabidae) of Fennoscandia*.

Here the term Fennoscandia includes all of Scandinavia, Finland and the Russian sector of Lapland and Karelia, east as far as the line Swir—Onega—Lake Wyg—Wyg River—Soroka (on the White Sea). The boundaries recognized before 1939 are used throughout.

In this part the information pertaining to each species has been arranged in the following sequence: Name of the species, Distribution, Ecology, Biology, Dynamics, Variation, Systematics, and Fossil records.

All species have been arranged in alphabetical order. An asterisk before the species name indicates that it is depicted in the maps published in Part II.

It is recommended that Part III of this work be read first to have a complete understanding of the author's views.

This work should prove immensely useful to entomologists of wide specialities, more particularly experimental ecologists, zoogeographers, taxonomists and others.











# Ground Beetles (Carabidae) of Fennoscandia









## Smithsonian Institution Libraries

WASHINGTON, D.C. 20560 202-357-2240

The Smithsonian Institution Libraries has selected your library to receive *gratis* copies of volumes published in our Translations Publishing Program. Under this program, significant non-English-language works that related to a field of Smithsonian research are translated and published with Special Foreign Currency funds according to the provisions of Public Law 480. We hope that you will find this publication a useful addition to your collection. We would appreciate receiving a copy of all reviews of this work.

Additional copies of this work may be purchased from the National Technical Information Service (N.T.I.S.), Springfield, Virginia, 22161. Please cite the TT (Technical Translation) number printed on the Copyright page when ordering from N.T.I.S.

Let us know if your copy of this book is incomplete or damaged.

Please direct all inquiries and address corrections to:

Translations Publishing Program  
Smithsonian Institution Libraries  
Natural History Building 22  
Washington, D.C. 20560

202/357-1850

August 1992





# Ground Beetles (Carabidae) of Fennoscandia

## A Zoogeographic Study

### PART I

#### Specific Knowledge Regarding the Species

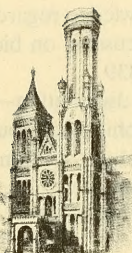
CARL H. LINDROTH

*Scientific Editor*

JOACHIM ADIS

*Scientific Coordinator*

TERRY L. ERWIN



Smithsonian Institution Libraries  
and

The National Science Foundation  
Washington, D.C.

1992

TT 79-52039/01

Die Fennoskandischen Carabidae: Eine Tiergeographische Studie  
I. Spezieller Teil.

Elanders Boktryckeri Aktiebolag  
Göteborg 1945

© 1992 Amerind Publishing Co. Pvt. Ltd., New Delhi

Translated from the German  
Translator: Dr. J.S. Bhatti  
General Editor: Dr. V.S. Kothekar

**Library of Congress Cataloging-in-Publication Data**

Lindroth, Carl Hildebrand, 1905—

Ground beetles (Carabidae) of Fennoscandia.

Translation of: Die fennoskandischen Carabidae.

Bibliography: p.

Contents: pt. 1. Specific knowledge regarding the species—pt. 2. maps—  
pt. 3. General analysis, with a discussion on biogeographic principles.

Supt. of Docs. no.: SI 1.2.: B39

1. Carabidae—Geographical distribution—Collected works.

2. Insects—Scandinavia—Geographical distribution—Collected works.

3. Insects—Finland—Geographical distribution—Collected works.

I. Adis, Joachim, 1950— . II. Erwin, Terry L., 1940— . III. Title.

QL596.C2L5313 1989 595.76'2 87-600154

Translated and published for the Smithsonian Institution Libraries,  
pursuant to an agreement with the National Science Foundation,  
Washington, D.C., by Amerind Publishing Co. Pvt. Ltd.,  
66 Janpath, New Delhi 110 001

Printed at Pauls Press, New Delhi, India

*Dedicated to*  
*L.A. Jägerskiöld*

Published with the support of  
Längmanska Kulturfonden





## CONTENTS

FOREWORD TO THE ENGLISH-LANGUAGE EDITION	ix
FOREWORD BY THE SCIENTIFIC EDITOR	xi
PREFACE	xiii
MAP OF FENNOSCANDIA	xvii
EXPLANATION OF ABBREVIATIONS	xix
I. INTRODUCTION TO PART I	1
II. MATERIAL	5
III. THE SPECIES	15
BIBLIOGRAPHY	604
LIST OF SYNONYMS OF SPECIES AND GENERA	627





## FOREWORD TO THE ENGLISH-LANGUAGE EDITION

*The Smithsonian Institution Libraries, in cooperation with the National Science Foundation, has sponsored the translation into English of this and hundreds of other scientific and scholarly studies since 1960. The program, funded with Special Foreign Currency under the provisions of P.L. 480, represents an investment in the dissemination of knowledge to which the Smithsonian Institution is dedicated. The books published in this program are permanently available from the National Technical Information Service, Springfield, Virginia 22161. Orders may be placed according to the TT (Technical Translation) number which appears on the copyright page.*

As a graduate student at the University of Alberta in the 1960s, I used the three volumes of Carl Lindroth's *The Ground Beetles of Canada and Alaska* daily. This monumental series, so rich in information about this dominant group of beetles, had as its foundation Professor Lindroth's earlier work on Fennoscandian ground beetles. That classical study was written in German and its information was therefore inaccessible to me and to many other North American coleopterists who would have benefited greatly from the contributions of this work. In 1979 when I had the opportunity to submit proposals to the Smithsonian Libraries Translations Program for translations of significant works in my field, my mind went back immediately to my frustrations and those of many colleagues who did not know German and were therefore not acquainted with the fundamental literature on experimental ecology of ground beetles (Carabidae). I contacted Professor Lindroth, Chairman of the Department of Entomology at Lund University (Sweden), Zoological Institute, whom I had met in Alberta in 1968 and had visited in Sweden in 1970. With his permission, I submitted all three volumes of his work on Fennoscandian ground beetles for translation to the Smithsonian Libraries Translations Program. Although the project was not completed before Professor Lindroth's

death in 1980, his family has granted the Smithsonian Libraries permission to publish the translation as originally planned. The project is now completed, thanks to many individuals, and especially to Joachim Adis, Scientific Editor.

Terry L. Erwin, Scientific Coordinator  
Curator, Department of Entomology  
National Museum of Natural History  
Smithsonian Institution  
Washington, D.C.

December 1988

## FOREWORD BY THE SCIENTIFIC EDITOR

Sometimes scientific studies tread strange pathways. This translation is an example. The study was written in Sweden by Professor Carl H. Lindroth in the German language (vintage 1940s), translated in India (1979–87), scientifically edited in the Amazon Basin (in 1987–89), doubly cross-checked at the Smithsonian Institution in Washington, D.C., and at the Max-Planck-Institute in West Germany, re-read on airplanes between Europe and South America, and given final approval by Terry L. Erwin at the Smithsonian Institution.

We have tried hard to master the language, the author's style, and his scientific approach and, retaining Lindroth's meaning, bring them into a comprehensible English. The original text was written in a style of an earlier generation with which I, the scientific editor, although a native German, am not totally familiar. Lindroth's death in 1980 precluded consultation with the author, but I have tried to come as close as possible to the original German. As a strategy, we edited Part III first and followed as strictly as possible the terms in the English summary that Lindroth himself had provided. Ecological terms follow the English equivalents given in Schaefer & Tischler's *Ökologie* (Stuttgart: G. Fischer, 1983). Other standard and specific word sources consulted were *Cassell's German-English, English-German Dictionary* (London, 1980), *Webster's New Collegiate Dictionary* (Springfield, 1980), and *A Glossary of Entomology* by Torre-Bueno (New York: New York Entomological Society, 1978). "Modern" scientific words were omitted wherever Lindroth used language of an earlier period—e.g. "area" instead of "range", "reducers" instead of "decomposers", "historical view" instead of "phylogenetic view". This is particularly true where terms were defined by Lindroth himself, as in the cases of "area" (Part III, p. 417) and "dynamics" (Part III, p. 13). Editorial explanations in text and footnotes are clearly marked and given in parentheses (in the running text with quotation marks). Original footnotes have an asterisk or numbers. Numbers in the left margin throughout the text correspond with the pagination of the original published version (in German). All page ci-



tations in the current text of this translation also refer to pagination in the original work. We recommend that Part III be read first and that Parts I and II be used as reference resources.

Joachim Adis, Scientific Editor  
Max-Planck-Institute for Limnology,  
Tropical Ecology Working Group, Plön,  
Germany

Manaus, Brazil  
December 1988

## PREFACE

This work is published in three parts:

I. *Specific Knowledge Regarding the Species*: The distribution, ecology, biology, and other significant zoogeographic facts are summarized for every species. The species are arranged in alphabetical order.

II. *Maps*: These cover Fennoscandia and its adjacent regions, and are likewise arranged alphabetically. A separate map is given for each species. Maps are not provided for species which occur sporadically or singly in the region.

III. *General Analysis, with a Discussion on Biogeographic Principles*: An attempt to treat the animal material under several, in part widely divergent general aspects. All these considerations have the same objective however, namely, to understand the postglacial and, where possible, the glacial history of the fauna of Fennoscandia.

The term "Fennoscandia" includes here all of Scandinavia, Finland, and the Russian sector of Lapland and Karelia, east as far as the line: Swir–Onega–Lake Wyg (Uikujärvi)–Wyg River–Soroka (on the White Sea). The boundaries recognized before 1939 are used throughout.

An investigation of this magnitude could never be the work of just one man. On the contrary, it is a summation of all the research done during more than a hundred years on Nordic beetles of the family Carabidae. Although I always tried to furnish new primary material through my own collecting activities and observations as well as through examination of new data of other entomologists, my primary task has unquestionably been that of a critical compiler. By far the most reliable sources were neither the literature, nor the public collections, but rather the personal experiences of Nordic entomologists in the last two decades.

Unfortunately it is not possible to mention here all those persons who have selflessly assisted my research through contributions of material and information.

In Sweden the major contributors were Mr. Anton Jansson and Mr. Thure Palm, and the heads of the entomological collections in the Riksmuseum of Natural History in Stockholm, the University of Lund, and the Natural History

Museum in Göteborg, namely, Prof. O. Lundblad, Prof. N.A. Kemner, and Lic. Phil. H. Lohmander. The latter placed at my disposal his entire and very extensive collection of sieve material from southern Sweden.

In Norway the late Thomas Munster showed me his unlimited kindness and Andreas Strand was an inestimable help. Among other things, he placed his manuscript on the beetles of northern Norway at my disposal. The head of the entomological collections of the University of Oslo, curator L.R. Natvig, greatly supported my work through his unfailing cooperation.

In Finland, where the number of distinguished lovers ("of entomology"; suppl. scient. edit.) is indeed impressive, unbounded goodwill was constantly forthcoming. I mention only my dear friend, Rolf Krogerus, and Dr. Harald Lindberg who, together with his two sons, has compiled the largest private collection of beetles in the north. The heads and officials of the public collections were commendably patient with my persistent inquiries and always helpful. These were Dr. Phil. R. Fery, Mag. Phil. W. Hellén at the Zoological Museum of the University (Helsinki), Prof. U. Saalas at the Agricultural and Forest Zoological Institute (Helsinki), and Professors W. Linnaniemi and K.J. Valle, respectively erstwhile and present heads of the zoological collections in the University of Åbo (Turku).

In Denmark I am greatly indebted to Aug. West in particular. In the Baltic states I received complete and invaluable information from Mag. Phil. H. Haberman, Dorpet (Tartu) and Dipl. Agr. Th. Lackschewitz, Libau (Liepaja).

Among the entomologists from other countries, each of whom unfailingly complied with my requests, let me gratefully mention not only my friend, Karl Holdhaus, but also Adolf Horion, Fritz Netolitzky, and Hans Wagner.

Nevertheless the first part of this work is dedicated not to an entomologist but to my fatherly friend, L.A. Jägerskiöld. As curator of the Natural History Museum of Göteborg, where despotism openly prevailed at the time, he followed my research from the outset with unflagging interest and sometimes practised constructive criticism as well. Indeed it is through his efforts, as well as those of his successor, Dr. O. Nybelin, that the funds necessary for the exorbitant printing costs of such a voluminous work were raised. For that reason my private collection of Nordic Carabidae and the card index of all Swedish carabid localities shall be transferred to the ownership of the Natural History Museum in Göteborg.

My entomological excursions in Scandinavia since 1924 have been supported by the Royal Swedish Academy of Sciences, Lars Hiertas Minne, Kungl. och Hvitfeldtska Stipendieinrättningen, and Svenska Turistföreningen. To these institutions I extend my respectful gratitude.

Much work has been done in our science throughout the late decade. In spite of apparent problems Nordic entomology, and especially that which is ecologically oriented, is heading toward a golden period—the younger genera-



tion of researchers in this field holds great promise. This work might possibly afford them further encouragement.

Djursholm  
May, 1944

Carl H. Lindroth









## EXPLANATION OF ABBREVIATIONS

### A. Provinces and other divisions of Fennoscandia (see map on p. xvii)

#### I. Sweden (three letters, the first capital)

Åns = Ångermanland	Nbt = Norrbotten
Åsl = Åsele-lappmark	Nke = Närke
Ble = Blekinge	Ögl = Östergötland
Boh = Bohuslän	Öld = Öland
Dlr = Dalarne	Pil = Pite-lappmark
Dsl = Dalsland	Sdm = Södermanland
Gst = Gästrikland	Skå = Skåne
Gtl = Gotland	Små = Småland
Hjd = Härjedalen	Tol = Torne-lappmark
Hll = Halland	Upl = Uppland
Hls = Hälsingland	Vbt = Västerbotten
Jtl = Jämtland	Vgl = Västergötland
Lul = Lule-lappmark	Vrm = Värmland
Lyl = Lycksele-lappmark	Vst = Västmanland
Mdp = Medelpad	

#### II. Norway (Arabic numerals, the first capital)

1 to 41 (from Dahl, Lid and Munster, 1924)

#### III. Finland and Russian sector (two letters, the first capital)

Ab = Regio aboënsis	Kl = Karelia ladogensis
Al = Alandia	Kn = Karelia onegensis
Ik = Isthmus karelicus	Ko = Karelia olonetsensis
Ka = Karelia australis	Kr = Karelia pomorica orientalis <sup>1a</sup>
Kb = Karelia borealis	Ks = Kuusamo
Kc = Karelia pomorica occidentalis	Kt = Karelia transonegensis <sup>1b</sup>
Kk = Karelia keretina	Le = Lapponia enontekiensis

<sup>1a-b</sup>In reality located outside the region.

Li = Lapponia inarensis	Ob = Ostrobothnia borealis
Lj = Lapponia ponojensis	Ok = Ostrobothnia kajanensis
Lk = Lapponia kemensis	Om = Ostrobothnia media
Lm = Lapponia Imandrae	Sa = Savonia australis
Lp = Lapponia petsamoënsis	Sb = Savonia borealis
Lt = Lapponia tulomensis	St = Satakunta
Lu = Lapponia murmanica	Sv = Regio svirensis
Lv = Lapponia varsugae	Ta = Tavastia australis
Nl = Nylandia	Tb = Tavastia borealis
Oa = Ostrobothnia australis	

B. Museums and other public collections (two unspaced capital letters, not followed by a period)

FA = Forest Zoological Institute, Helsinki
HM = Hälsingborg Museum
KF = Kävsta Folkhögskola
LD = Sundsvalls Läroverk
LF = Falu Läroverk
LG = Hvitfeldtska Läroverket, Göteborg
LJ = Jönköpings Läroverk
LK = Kalmar Läroverk
LL = Luleå Läroverk
LÖ = Östermalms Läroverk, Stockholm
LS = Skara Läroverk
LU = Umeå Läroverk
LV = Västerås Läroverk
MÅ = Zoological Museum, University of Åbo
MB = Zoological Museum, University of Berlin
MD = Trondheim Museum
ME = Bergen Museum
MG = Natural History Museum, Göteborg
MH = Zoological Museum, University of Helsinki
MI = Entomological Institute, Berlin-Dahlem
MK = Kuopio Museum
ML = Zoological Institute, University of Lund
MM = Malmö Museum
MO = Zoological Museum, University of Oslo
MS = Zootomical Institute, Högsökan, Stockholm
MT = Tromsö Museum
MU = Zoological Institute, University of Uppsala
MV = Stavanger Museum
MW = Natural History Museum, Vienna

- NL = Svenska Normallyceum, Helsinki
- RM = Riksmuseum of Natural History, Stockholm
- RS = Sanatoriet, Romanäs
- SA = Skogsförsöksanstalten, Stockholm
- SH = Skogshögskolan, Stockholm
- SU = Folkskoleseminariet, Uppsala
- VA = Växtskyddsanstalten, Stockholm
- VM = Vänersborgs Museum

C. Journals and other publications (two to three capital letters, each followed by a period)

- B.E.Z. = Berliner Entomologische Zeitschrift
- C.C. = Coleopterologisches Centralblatt, Berlin
- C.C.F. = Catal. Coleopt. Daniae et Fennoscandia, Helsinki, 1939
- D.E.Z. = Deutsche Entomologische Zeitschrift, Berlin
- E.A. = Entomologischer Anzeiger, Vienna
- E.B. = Entomologische Blätter, Krefeld (and other places of printing)
- E.B.H. = Entomologische Berichten, Haag
- E.F.F. = Memoranda Societas Fauna Flora Fennica, Helsinki
- E.M. = Entomologiske Meddelelser, Copenhagen
- E.M.D. = Entomologische Mitteilungen, Berlin-Dahlem
- E.M.M. = Entomologists' Monthly Magazine, London
- E.N. = Entomologische Nachrichten, Putbus
- E.T. = Entomologisk Tidskrift, Stockholm
- F.F. = Flora og Fauna, Aarhus (and other places of printing)
- H.E.R. = Horae Soc. Ent. Ross., Leningrad
- K.R. = Koleopterologische Rundschau, Vienna
- M.F.F. = Meddelanden Societas Fauna Flora Fennica, Helsinki
- N.E. = Notulae Entomologicae, Helsinki
- N.E.T. = Norsk Entomologisk Tidsskrift, Oslo
- N.F.F. = Notiser Societas Fauna Flora Fennica, Helsinki
- O.E. = Opuscula Entomologica, Lund
- P.P.E. = Polskie Pismo Entomologiczne, Lwów
- S.E.Z. = Stettiner Entomologische Zeitung
- S.H.A. = Suomen Hyönteistieteellinen Aikakauskirja, Helsinki
- T.E. = Tijdschrift voor Entomologie, Haag
- W.E.Z. = Wiener Entomologische Zeitung

D. Authors and Collectors (three unspaced capital letters not followed by a period)

- |              |              |
|--------------|--------------|
| ADR = Ander  | ÅGR = Ågren  |
| ADZ = Adlerz | AHT = Ahlrot |
| AGR = Agrell | AIL = Ailio  |

ALM = Almgren	BSK = Barovski
ALR = Alinder	BSS = Bäckström, S.
AMM = Ammitzböll	BUE = Brunier
AND = Andersson, C. G.	BUR = Burmeister
ANK = Ankarcrona	BUT = Butovitsch
ANS = Andersson, Josef	
APF = Apfelbeck	CAI = Caillol
ARN = Arnberg	CAJ = Cajander
ARV = Arvall	CDB = Cederbom
ARW = Arwidsson, Erik	CDG = Cedergren
AUR = Aurivillius	CDS = Cederström
	CHD = Chaudoir
BBG = Blomberg	CHM = Chapman
BCH = Borchert	CHP = Champion
BCK = Backlund	CHR = Christoffersson
BDR = Brander	CKI = Csiki
BED = Bedel	CLL = Collins
BEN = Benander	CLS = Clasen
BFF = Bonsdorff, A. and J. E.	COL = Colliander
BGR = Bergroth	CPR = Corporaal
BGW = Bergwall	CPT = Carpenter
BKH = Bickhardt	CRN = Cornelius
BKM = Baeckmann	CRP = Carpelan
BLK = Blunck	CST = Castrén
BLL = Bernell	CTT = Collett
BLQ = Blomqvist	
BLR = Blair	DAL = Darlington
BNG = Bengtsson, Simon	DEV = Deville, Sainte-Claire
BNN = Bänninger	DHG = Dahlgren
BOD = Bodemeyer	DHM = Dahms
BOH = Boheman	DLT = Dalla Torre
BOM = Boman	DPF = Dampf
BRC = Bruce	DTZ = Dietze
BRD = Brundin	
BRG = Burgess	ECH = Eichler
BRK = Brinck	EDG = Edgren
BRM = Brammanis	EGG = Eggers
BRN = Barner	EGT = Engelhart
BRR = Brenner	EHB = Ehnbohm
BRS = Brauns	EHN = Ehnberg
BRT = Brattström	EIS = Eisen
BRU = Breuning	EKB = Ekeberg
BSH = Bäckström, Hj.	ELF = Elfving



ELG = Ellingsen  
 ELL = Enckell  
 ELM = Elmladh  
 ELS = Eliasson  
 ENG = Engdahl  
 ENW = Enwald  
 ERC = Ericson, I. B.  
 ERL = Erlandsson  
 ERS = Erichson, W. F.  
 ESM = Esmark  
 EVK = Ernvik  
 EVS = Everts

FBG = Fredberg  
 FBT = Fabritius  
 FCK = Franck  
 FCS = Friederichs  
 FDL = Findal  
 FGQ = Fogelqvist  
 FHL = Fahlander  
 FHR = Fähræus  
 FIE = Fries, Einar  
 FLC = Fliche  
 FLH = Flach  
 FLK = Falkenström  
 FLL = Fallén  
 FLM = Florman  
 FRG = Frigeliuss  
 FRI = Frisendahl  
 FRL = Forsslund  
 FRM = Formanek  
 FRS = Forsius, R.  
 FRT = Fortelius  
 FSI = Forsius, I.  
 FUE = Fuente  
 FUR = Furuhielm  
 FWL = Fowler

GAD = Gadamer  
 GAL = Gallois  
 GAV = Gavoy  
 GBL = Grönblom

GGL = Ganglbauer  
 GLK = Geilenkeuser  
 GLL = Grill  
 GPE = Grape  
 GRD = Gersdorf  
 GRH = Gerhardt  
 GRI = Gridelli  
 GRQ = Grenquist  
 GRV = Grönvall  
 GTZ = Gaunitz, C. B., D. and S.  
 GÜN = Günther  
 GYL = Gyllenhaal

HAB = Haberman  
 HAG = Hagemann  
 HÄY = Häyrén  
 HBG = Heimbürger  
 HBL = Hallonblad  
 HCK = Hackwitz  
 HDH = Holdhaus  
 HDL = Hemdal  
 HDS = Hederström  
 HEB = Heberdey  
 HEL = Helenius  
 HEQ = Hequist  
 HEY = Heyden  
 HFM = Hoffmann  
 HFS = Hoffstein  
 HGC = Haglund, C. J. E.  
 HGL = Haglund, E. L.  
 HGN = Holmgren, A. E.  
 HJG = Höjding  
 HJT = Hjelt  
 HLB = Halbert  
 HLG = Holgersen  
 HLL = Hellén  
 HLM = Hellman  
 HLQ = Holmquist  
 HLS = Helliesen  
 HMB = Holmboe  
 HMM = Hammarström  
 HNM = Hainmüller

HNR = Henriksen  
 HNS = Hanson, B. H.  
 HOR = Horion  
 HRM = Hermansson  
 HRT = Hartmann  
 HSL = Henseler  
 HSN = Hansen, V.  
 HSR = Hellström  
 HSS = Hanssen, K. H.  
 HST = Hostinsky  
 HTG = Hultgren  
 HUB = Hubenthal  
 HZE = Heinze

ING = Ingelström  
 ISH = Ischreyt  
 IVS = Ivaschineff

JAC = Jacobson  
 JEA = Jeannel  
 JEN = Jensen, Fr.  
 JHN = Johanson, C. H.  
 JHS = Johnson  
 JNN = Jänner  
 JNS = Jansson, Anton  
 JRV = Järvinen  
 JSH = Jensen-Haarup  
 JSS = Jessen

KAN = Kanerva  
 KHG = Kolthoff, G.  
 KHK = Kolthoff, Kj.  
 KHN = Kühnelt  
 KLB = Kolbe  
 KLE = Kleine  
 KLF = Klefbeck  
 KLG = Klingstedt  
 KLK = Klinckowström  
 KLM = Kihlman  
 KLS = Kolström  
 KMK = Kinnmark  
 KMN = Kemner

KNG = Kangas, E.  
 KRG = Krogerus, R.  
 KRH = Krogerus, H.  
 KRS = Krauss  
 KRV = Karvonen  
 KRZ = Krantz  
 KST = Kihlstedt  
 KTK = Kontkanen  
 KTT = Kittel  
 KTY = Kuthy  
 KTZ = Kuntze  
 KZN = Kuntzen

LAP = Lapouge  
 LAU = Lauterborn  
 LBÅ = Lindberg, Håk.  
 LBG = Lindberg (coll.)  
 LBH = Lindberg, Har.  
 LBK = Lundbeck  
 LBL = Lundblad  
 LCK = Lackschewitz  
 LDL = Lundell  
 LDN = Landin  
 LDR = Leder  
 LDV = Lundevall, K. F.  
 LEB = Lebedev  
 LEI = Leino  
 LEV = Levander  
 LEW = Lewin  
 LFF = Leffler  
 LFG = Löfgren (Finl.)  
 LGB = Lingonblad  
 LGN = Lindgren  
 LGR = Löfgren (Swed.)  
 LJG = Ljungh  
 LLJ = Lilljeborg  
 LLL = Lüllwitz  
 LLR = Leiler  
 LMK = Lönnmark  
 LMN = Lomnicki  
 LNG = Lengerken  
 LNM = Linnman

LNN = Linnaniemi  
 LNZ = Lentz  
 LOH = Lohmander  
 LPA = Lampa  
 LPT = Lie-Pettersen  
 LRN = Larsen, Elinor Bro  
 LRS = Larsson, Sv. G.  
 LSH = Lutshnik  
 LSN = Lesne  
 LST = Lundström  
 LTH = Lindroth  
 LTK = Lyttkens  
 LTV = Lahtivirta  
 LTZ = Letzner  
 LUG = Lundgren  
 LUI = Luigioni  
 LYS = Lysholm

MAK = Makólski  
 MAL = Malaise  
 MAS = Masaraki  
 MAZ = Mazur  
 MCH = Muchardt  
 MCK = Munck af Rosenschöld  
 MDL = Mandl  
 MEI = Meinert  
 MER = Merisuo  
 MEX = Meixner  
 MEY = Meyer  
 MHJ = Munsterhjelm  
 MHL = Mühlen  
 MID = Meidell  
 MIK = Mikutowicz  
 MIL = Miländer  
 MJB = Mjöberg  
 MKK = Mikkola  
 MKL = Mäklin  
 MLB = Mellerborg  
 MLC = Möller, C.  
 MLF = Möller, G. F.  
 MLG = Möller, Gösta  
 MLL = Möller, L.

MNH = Mannerheim  
 MRT = Mortonson  
 MST = Munster  
 MTL = Montell  
 MÜH = Müller, H.  
 MÜL = Müller, G. (J.)

NBG = Nürnberg  
 NBL = Nyblaeus  
 NDM = Nordman  
 NDN = Nordin  
 NER = Nerén  
 NET = Netolitzky  
 NOT = Notini  
 NSL = Nessling  
 NST = Nordström  
 NTH = Nathorst  
 NTV = Natvig  
 NUM = Numers  
 NYH = Nyholm  
 NYL = Nylander

OBT = Obert  
 OGI = Ogijewicz  
 ØKL = Økland  
 OLS = Olsson, Ax.  
 OMH = O'Mahony  
 ORS = Orstadius  
 OSS = Ossiannilsson  
 ÖST = Östrand  
 OTT = Ottander  
 OTZ = Oertzen

PAY = Paykull  
 PFF = Platonoff  
 PHJ = Pohjola  
 PJT = Pjatakowa  
 PLQ = Palmqvist  
 PLZ = Polentz  
 PME = Palmén, E.  
 PMJ = Palmén, J. A.  
 POM = Pomeranzew

POR = Porat	SBF = Sahlberg, F.
PPP = Poppius	SBJ = Sahlberg, J.
PRS = Persson, Herm.	SBR = Schauburger
PRT = Perttunen	SCH = Schönherr
PST = v. Post, S. Ad.	SCK = Starck
PTA = Porta	SCL = Schille
PTI = Petri	SDG = Schneider, G.
PTK = Putkonen	SDH = Sundholm
PTT = Pettersson, C. P. J.	SDL = Seidlitz
PTY = Petry	SDM = Söderman
PTZ = Peetz	SDN = Sandin
PUZ = Putzeys	SDR = Schneider, O.
	SDT = Schiødt
RAJ = Rajalin	SDV = Sundevall
RCL = Reclaire	SEM = Semenov
RDB = Rudebeck, G.	SFR = Suffrian
RDL = Rosendal	SHL = Schnell-Larsen
REU = Reuter, E. and O. M.	SHM = Schaum
RGS = Ringselle	SHY = Schøyen, W. M.
RHL = Rathlef	SIE = Siebke
RMN = Roman	SJB = Sjöberg
RNA = Ringdahl, A.	SJG = Sjögren
RNG = Ringdahl, O.	SKY = Schilsky
RNK = Renkonen	SLK = Schlick
RNS = Rensch	SLL = Sellman
ROG = Roger	SLV = Salvén
ROL = Rolander	SMM = Sommerfelt
ROS = Rosén	SMZ = Smreczynski
ROU = Roubal	SND = Sandahl
RSB = Rosenberg	SNR = Schneider, G. W.
RSK = Rüschkamp	SOO = Soot-Ryen
RSS = Rasmussen	SOR = Sorauer
RTB = Rottenberg	SPB = Sperber
RTT = Reitter	SPR = Speiser
RTV = Ritavuori	SPS = Schneider, J. Sparre
RUD = Rudolphi, J.	SPT = Spaeth
RVA = Ravnä	SRN = Stern
	SRS = Sievers
SAA = Saalas	SSK = Sorsakoski
SAD = Sandman	STA = Strand, Andreas
SAR = Saarinen	STÅ = Stora
SBC = Sahlberg, C. R.	STB = Stenberg



STD = Staudinger  
 STE = Strand, Embrik  
 STH = Ströhm  
 STK = Stockmann  
 STM = Storm  
 STN = Stenius  
 STR = Strasser  
 STX = Stuxberg  
 SUC = Sucksdorff  
 SUD = Sundman  
 SUE = Suomalainen, E.  
 SUH = Suomalainen, H.  
 SUM = Sumakow  
 SUN = Sundelin  
 SUS = Suenson, Eig.  
 SVS = Svensson, Gösta  
 SWB = Swanberg, P. G.  
 SZE = Szekessy  
 SZL = Szeliga-Mierzeyewsky  
 SZM = Schatzmayr

TBL = Tunblad  
 TEN = Tenenbaum  
 TFV = Trafvenfeldt  
 TGR = Tullgren  
 THG = Thuneberg  
 THS = Thomson  
 TIM = Timelin  
 TJB = Tjeder, Bo  
 TJT = Tjeder, Tord  
 TRP = Trappen  
 TTR = Tschitschérine

ULL = Ullmann  
 ULN = Ulanowski  
 ULV = Ulvinen  
 UYT = Uyttenboogaart

VLE = Valle  
 VNS = Varenius

VOG = Vogel  
 VST = Vestman  
 VYL = de Vylder

WAS = Wasastjerna  
 WBG = Wahlberg  
 WBL = Winbladh  
 WEG = Wegelius  
 WGN = Wagner, Hans  
 WGR = Wahlgren  
 WGS = Wingstrand  
 WHF = Westhoff  
 WHM = Westholm  
 WIB = Wiberg  
 WKS = Wikström  
 WLA = Welander, Arvid  
 WLD = Westerlund, O.  
 WLE = Welander, Elving  
 WLG = Wallengren, H. D. J.  
 WLK = Wilken  
 WLL = Wellenius  
 WLN = Wilner  
 WNG = Wångdahl  
 WOL = Wollebaek  
 WPK = Wiepken  
 WRG = Westring  
 WRL = Warloe  
 WRN = Wirén, E.  
 WSB = Weissberg  
 WSJ = Wängsjö  
 WSL = Wieslander  
 WST = Woldstedt  
 WUO = Wuorentaus

XAM = Xambeu

ZPT = Zumpt  
 ZRN = Zernander  
 ZTT = Zetterstedt

## E. Other abbreviations

coll.	= collectio (in the collection of) <sup>2</sup>
det.	= determinavit (determined by ...)
dom.	= dominant
K. V. Ak.	= Kungl. Svenska Vetenskaps-Akademien
Lok.	= locality (geographic locality of record)
Mskr.	= manuscript
<i>reg. alp.</i>	= regio alpina (above or north of the timber line)
<i>reg. bet.</i>	= regio betulina (birch region of the fjelds)
<i>reg. silv.</i>	= regio silvatica (coniferous forest zone)
!	= personally seen or checked

Other abbreviations are readily understandable.

<sup>2</sup> On the printed locality labels of the Zoological Institute, University of Lund (ML), the indication "coll." has been used in recent years in the same way that the term "leg." is used by botanists (= collected by ...). This expression has thus been used before the names of very casual collectors also, who did not keep a private collection.

## CHAPTER I

# Introduction to Part I

11† The mode of presentation of species in this work proved to be a perplexing problem. A taxonomic arrangement, followed by Winkler in his *Catalogus Coleopterorum regionis palaearcticae* (Vienna, 1924), and in the Nordic Catalogus (1939), seemed inevitable, but in the arrangement of Carabidae by Csiki (1927–1933) in Junk and Schenkling's Catalogus, extensive changes were incorporated and, more recently, Jeannel (1941–1942) drastically rearranged the classification of this family. These "systems" are rapidly out of date or reflect alternating and subjective points of view which are of secondary importance to a zoogeographic investigation, such as presented here. Fitting the species into distributional groups based solely on zoogeographic analysis did not prove feasible. The linear arrangement of species, families, etc. in the systematics already fails to portray the branching of a phylogenetic tree. This failure becomes more pronounced in zoogeography where almost every conceivable transition can be found between the major distributional groups, in addition to wholly isolated occurrences. Hence an alphabetical sequence seemed the simplest and most appropriate in both Parts I and II of this work. Such a presentation is particularly appropriate in zoogeographic research since every grouping of material tends to mask the fundamental fact that *every species presents its own particular problem*.

Information pertaining to each species has been arranged as follows:

1. *Name of species*, and its most important synonyms: These are summarized in the "List of Synonyms of Species and Genera" presented at the end of this book. An asterisk (\*) before the species name indicates that it is depicted in the maps published in Part II.
- 12 2. *Distribution*: Maps published earlier are cited where necessary, followed by the precise occurrence of species within the Fennoscandian region. Whether the gaps in distribution of a given species reflected in the maps are due to its actual absence or to insufficient investigation has been carefully considered.

†(Pagination of the original German version to which page citations in the text of this translation are referring to; suppl. scient. edit.).

Enumeration of all the localities could only be given for scarce or particularly interesting species. However, localities demarcating the limits of distribution of each species are always mentioned. It likewise seemed essential to examine all doubtful or demonstrably wrong data, so that the latter in particular could be conclusively excluded in the future. Distribution in adjacent regions and a summary of the total area of distribution conclude this section: *The political boundaries recognized before 1939 are used in this work.*

a) **Sweden.** Information is arranged according to the traditional provinces ("Landskap"). Only the largest of these, Lapland, is divided into the usual five "lappmarks". The abbreviations used here consist of three letters and coincide with those given in the map at the beginning of Part I, and are explained in the "Explanation of Abbreviations". Swedish entomologists have not considered it necessary to delineate "natural" provinces (as done in Norway and Finland).

b) **Norway.** All localities for which no source has been cited are from Munster's handwritten catalog (Zoological Museum, University of Oslo). The biogeographic deviations proposed by Dahl, Lid and Munster (1924) have been followed mainly because such are used in the Catalogus (1939). The deviations suggested by M. Strand (*Norsk. Ent. Tidsskrift*, Oslo, 1943) are undoubtedly better.

c) **Finland and Russian sector.** The division into natural history provinces, and their Latin names, are used because they are favored by native entomologists. Abbreviations here consist of two letters. Renaming locales with Finnish names (see, for example, Soumen Hyonteist, Aikakauskirja, Helsinki, 1938, p. 128; and others), and consequently altering the abbreviations, has led to  
 13 unnecessary confusion. Thus Swedish and Finnish names for locales are used in the following manner: the names of cities and other well-known places are written in the Swedish language (e.g., Åbo instead of Turku, Uleåborg instead of Oulu), since these are internationally recognized; the same is generally true for lakes (e.g., Ladoga), islands (e.g., Hogland), etc.; the names of parishes and other small locales are written in the language employed by the majority of the local population. Data from the collection of Wasastjerna (including J. Sahlberg's) has been totally excluded because it is highly unreliable (see *Notulae Ent.* Helsinki, 1933, p. 63).

Isolated localities east and south of the boundaries of Fennoscandia have been included.

d) **Adjacent regions.** These include Denmark and the Baltic States (namely Estonia and Latvia). Records from the Leningrad region have also been included, as well as records from the British Isles, the Faeroe Islands, and Iceland, since they are of particular interest.

e) **Total area**†. The characteristic type of distribution is given for each species, using the following terms:

†(cf. pages 417 and 822 of Part III; suppl. scient. edit.).



*Circumpolar*: Europe, Asia and North America.

*Palearctic*: Europe and Asia, including Siberia, or at least regions east of about 60° E.

*Western Palearctic*: Europe and western Asia (eastward at most to western Turkestan). Possibly northern Africa as well.

*Euro-Caucasian*: Europe and the Caucasus.

*Euro-Mediterranean*: Europe and the Mediterranean parts of northern Africa and/or the Near East.

*Purely European*: Not outside the limits of Europe (absent in the Caucasus as well).

*Amphi-Atlantic*: Europe (possibly the remaining Mediterranean region as well) and North America.

The total area has necessarily been cryptically described and mainly delineates the limits of the area. Since the possible continuity eastward to Siberia is especially important in determining the distribution pattern of a Nordic species, I tried, insofar as possible, to examine specimens recorded from Siberia. In many cases, however, I had to rely solely on literature. I also deemed it necessary, in spite of additional printing costs, to cite literature sources for every distribution reported. The author who fails to do so becomes personally responsible for the information given (as did Burmeister, 1939), which places him in a highly unenviable position in view of the multitudinous wrong determinations of species, even in the relevant literature. Wherever possible, I have used primary sources and avoided catalogs and larger compilations. An obvious shortcoming is the incomplete coverage of Russian literature, in particular periodicals, since I do not know the language.

3. *Ecology*: All nonreferenced data originate from Fennoscandia. Observations from other regions are referenced and presented for comparison, especially for those species which occur rarely or sporadically in our country. It appeared worthwhile to give an eco-geographic comparison for several species, since they sometimes inhabit different biotopes in different regions. For example, a species that is more or less eurytopic in our region is stenotopic further south, or vice versa. In particularly interesting cases, the typical biotope of the given species is detailed.

4. *Biology*: Only two aspects are of interest from a zoogeographic point of view. —1) periods of development, in particular the stage of hibernation is useful information and was available in Larsson's work (1939) for almost every species; my conclusions seldom deviate from his. It was necessary, however, to scrutinize his data for the Swedish material, partly because his information for some species is scant, and partly because one cannot assume that the conditions of reproduction and hibernation in Fennoscandia are the same as those in Denmark. The distribution of monthly catches (hence generally *not* of individuals) of every species is given, mainly for southern Sweden (Skåne-Gastrikland, if not otherwise indicated), since the characteristic features are

- 15 lost in the north due to the short summer; —2) the diet of carabids, on which information in the literature is scarce and where I could not add much. I have to admit, that I made little effort to raise carabid larvae and my experience in their identification is limited. However, in cases where the biology of a carabid larva is known it has been observed, that habitat and diet do not, or only insignificantly, differ from those of the adult. I therefore believe that future studies of this aspect will not lead to a substantial change in our present concept of the biology and ecology of carabid species.

5. *Dynamics*<sup>†</sup>: The capability of dispersal<sup>††</sup> is assessed for each species. Flight capacity<sup>†††</sup> is particularly significant here. For that reason the structure of the hind wing and flight records are reported. Indirect evidence for flight capacity is also considered when, for instance, specimens have been found in places which they could only (or presumably) have reached by flying, e.g. on sea drifts or in a typical biotope. However, records such as that given by Cornelius (1884) for species from Elberfeld in "gas water" (in the gutters of gas tanks, filled with rain water) must be viewed with caution. He lists, among others, such species as *Dyschirius globosus* and *Calathus fuscipes* which, according to my knowledge, are always brachypterous.

6. *Variation*: Only those varieties are mentioned which are geographically restricted and occur in Fennoscandia. I have totally excluded aberrations or forms that occur outside the region.

7. *Systematics*: The taxonomic position of critical species is briefly discussed, whenever new data were available. My comprehensive account (in the Swedish language), *Svensk Insektfauna* (1942a), is referenced as are various special questions (1935c, 1939b, 1939–1940, 1943a). Subsequent to the earlier publication (1942a), only the following changes in taxonomy have been made: *Stenolophus* and *Tachyta* elevated from subgenera to genera, and *Agonum moestum* and *Bembidion tinctum* recognized as independent species.

- 16 8. *Fossil records*: The basic work in this field is of Henriksen (1933). Through the kindness of Prof. R. Spärck and Dr. S.L. Tuxen, a copy of the card index prepared by Henriksen on the literature in this field was sent to me, which ensured more complete data and saved much time. The presumed age of each record is generally indicated simply as preglacial, glacial (interglacial) or postglacial.

<sup>†</sup>(cf. page of 13 Part III; suppl. scient. edit.).

<sup>††</sup>(= dispersal power; suppl. scient. edit.).

<sup>†††</sup>(cf. page 820 of Part III; suppl. scient. edit.).

## CHAPTER II

# Material

- 17 A more precise account of the sources of literature and material should prove useful to future researchers in similar areas of Nordic coleopterology.

### A. Literature

My original plan was to list the literature for each country of the region separately. Subsequently a common list, including comparative literature as well, seemed more appropriate. This bibliography is presented at the end of Part I. Works which give basic information about the carabids of Nordic countries are lettered to indicate the relevant country or countries. It should be understood, however, that articles in local entomological journals, which treat only the fauna of that particular country, have generally been omitted since it is assumed that every careful future research worker would in any case thoroughly peruse these periodicals.

The comparative literature listed necessarily had to be selective. Other useful works could certainly have been included but some publications were not available and unlimited time could not be spent on the all-too-often futile perusal of the southern European journals or smaller general biological series. Unfortunately there is no worthwhile modern treatise on the ecology and distribution of European beetles. The work of Burmeister (1939) fails to meet even modest requirements. The best to date is Horion's *Faunistik* (1941), which thoroughly covers the fauna of Germany (s. l.) but otherwise gives only scant information on the ecology of carabids.

In addition to the works referenced in the bibliography, I carefully scanned the journals listed below. Useful information has been referenced in most cases in the text using abbreviations for the journal name (see "Explanation of Abbreviations").

- 18 Sweden

*Entomologisk Tidskrift*. Uppsala and Stockholm.  
*Opuscula Entomologica*. Lund.

## Norway

*Norsk Entomologisk Tidsskrift*. Oslo.

## Finland

*Notulae Entomologicae*. Helsinki.

*Suomen Hyönteistieteellinen Aikakauskirja (Annales Entomologici Fennici)*. Helsinki.

*Societas pro Fauna et Flora Fennica*. Helsinki. The series "Notiser," "Meddelanden," "Acta," and "Memoranda".

## Denmark

*Entomologiske Meddelelser*. Copenhagen.

*Flora og Fauna*. Aarhus, etc.

## Germany

*Berliner Entomologische Zeitschrift*. Berlin.

*Coleopterologisches Centralblatt*. Berlin.

*Deutsche Entomologische Zeitschrift*. Berlin.

*Entomologische Blätter*. Krefeld, etc.

*Entomologische Mitteilungen*. Berlin-Dahlem.

*Entomologische Nachrichten*. Putbus.

*Entomologische Zeitung*. Stettin.

## Austria

*Entomologische Zeitung*. Vienna.

*Koleopterologische Rundschau*. Vienna.

## Holland

*Entomologische Berichten*. The Hague.

*Tijdschrift voor Entomologie*. The Hague.

## Poland

*Polskie Pismo Entomologiczne*. L'vov.

## Great Britain

*The Entomologist's Monthly Magazine*. London.

I have examined most of the Swedish and Norwegian material even though it was not necessary to do so to the same extent for the latter since the entire Coleoptera material known in Norway (up to 1937) has been summarized in Munster's handwritten catalog. Nevertheless, I examined some voucher specimens of doubtful identification and substantial amount of unidentified material housed in museums (Zoological Museum of the University of Berlin,



Zoological Museum of the University of Oslo).

## Sweden

Naturhistorisches Reichsmuseum, Stockholm 50.—Zoogeographically valuable material which was mainly collected by Boheman, Bruce, Brundin (Abisko), A.E. Holmgren, Jansson (Gotska Sandön among others), Lampa, Lundblad, Poppius (Sarek), Sellman, Stål, Thedenius, and P.G. Wahlberg. Older specimens (before circa 1900) unfortunately carry only province names on the labels.

Naturhistorisches Museum, Göteborg.—Extensive and valuable material compiled principally by I.B. Ericson, Lohmander, G.F. Möller, and Sandin, as well as by Lindroth, Vestman, Westring, Wibery and Östrand. By and large the specimens are accurately labeled. My own collection of carabids (about 36,000 specimens) will be deposited in this museum.

Zoologisches Institut der Universität, Lund.—The original collections, comprising particularly the material of Zetterstedt, Thomson, and Roth, have been considerably enlarged in recent years due to an increase in entomological activity spurred by the curator, Prof. N.A. Kemner. There is also material from Ammitzböll, J. Andersson, Bengtsson, Brundin, Falkenström, Kemner, Rosén, Wahlgren, and numerous younger entomologists. The specimens are accurately labeled.

Zoologisches Institut der Universität, Uppsala.—Houses, among others, the collection of Gyllenhaal, valuable mainly from the point of view of systematics. Furthermore, older material, especially that of Cederstrom, Eisen, Lilljeborg, de Vylder, are with labels mostly indicating only the province.

20 Zootomisches Institut der Hochschule, Stockholm.—A small collection of species from central Sweden collected by Adlerz, Hj. Bäckström, and Juel.

Zoologische Abteilung von Växtskyddsanstalten, Stockholm 19.—A rather large and generally well-labeled collection from Ahlrot, Ankarcrona, Frisendahl, Fåhræus, Kemner, Lampa, Sellman, Timm, and Tullgren.

Entomologische Abteilung von Skogsförsöksanstalten, Experimentalfältet (near Stockholm).—Material of Grill, later supplemented by collections of forest insects by the officials of the Institute.

Forstliche Hochschule (Skogshögskolan), Experimentalfältet.—A small, older collection, chiefly from the Stockholm region, with among others, material of Grill and Mjöberg.

Museum Hälsingborg.—Rather extensive, well-labeled material, chiefly from Skåne, collected by G. Löfgren, C. Möller and Wetterhall.

Museum Malmö.—The old Wallengren collection from Skåne.

Museum Vänersborg.—Hackwitz's small collection.

Läroverket (High School), Falun.—An important provincial collection from



- Dalarne built on the collection of C.G. Andersson, and expanded by Klefbeck and many other collectors from Dalarne.
- Hvitfeldtska Läroverket, Göteborg.—Wilner's collection, chiefly from Småland and Öland.
- Läroverket, Jönköping.—Substantial, generally well-labeled collections of Gadamer and v. Porat, especially from Småland.
- Läroverket, Kalmar.—Part of L. Haglund's collection (the rest is in Jansson's collection).
- Läroverket, Luleå.—Svenonius' collection, chiefly from Norrbotten.
- Läroverket, Skara.—Significant old, almost totally unlabeled material (among others, the Lundberg collection).
- Läroverket, Sundsvall.—Material from Medelpad by Adlerz.
- Läroverket, Umeå.—Timelin's collection (probably also partly by Trafvenfeldt). Generally well-labeled specimens from southern Sweden and Lapland.
- Läroverket, Visby.—Single specimens of species from Gotland.
- 21 Läroverket, Västerås.—C.H. Johanson's collection, mainly from Västmanland.
- Läroverket, Växjö.—Ostensibly the Pontén collection.
- Östermalms Läroverk, Stockholm.—G. Hoffstein's collection from Uppland Runmarö.
- Samrealskolan (Middle School), Lidköping.—Ostensibly a small collection made by David Jansson from Västergötland.
- Folkskoleseminariet, Uppsala.—A.V. Post's collection (unfortunately almost totally unlabeled).
- Folkhögskolan, Kävsta.—Wangdahl's collection, from Narke and Halsingland.
- Sanatoriet, Romanäs.—A small local collection by E.G. Sundberg.

The following foreign museums also contain material from Sweden:

- Zoologisches Museum der Universität, Berlin.—A large part of Thomson's collection. Single specimens from Sweden are also present in the main collection.
- Zoologische Staatssammlungen, München.—Ostensibly material collected by S. Alinder.
- Staatliches Museum für Tierkunde, Dresden-Zwinger.—A smaller number of Swedish specimens in the geographic *Bembidion* collection.
- Museum of Comparative Zoology, Cambridge (Mass.), USA.—According to Horn and Kahle (1935–1937), houses S.I. Ljungh's material (? probably also Swedish Coleoptera).

#### Norway

- Zoologisches Museum der Universität, Oslo.—Greater part of the entire

Norwegian material of Coleoptera preserved here, primarily the extensive Munster collection. Material collected by Aall, Collett, Moe, Schøyen, Siebke, Embrik Strand, and others also present.

Museum Bergen.—Mostly material from the western region.

Museum Stavanger.—Considerable material from southwestern Norway, in particular that collected by Helliesen.

Museum Tromsø.—Large collection from northern Norway established by Sparre Schneider, and subsequently increased by Soot-Ryen.

22 Museum Trondheim.—In addition to older material, houses the large Lysholm collection, chiefly from central Norway.

Material from Norway is also preserved in the following museums:

Naturhistorisches Reichsmuseum, Stockholm.—Old material from Boheman's collection.

Naturhistorisches Museum, Göteborg.—Lindroth's material.

Zoologisches Institut der Universität, Lund.—Old but well-labeled material of Zetterstedt.

Zoologisches Museum der Universität, Helsinki.—Older material, particularly from southern Varanger.

Zoologisches Museum der Universität, Berlin.—Greater part of Embrik Strand's material. Also single specimens of species from Norway.

Oxford University.—Material from expeditions to northern Norway in 1921 and 1930.

## Finland

Zoologisches Museum der Universität, Helsinki.—Extensive, geographically arranged material of native Coleoptera collected by J. Sahlberg, which has since been notably expanded. For a long time, Finnish entomologists followed the exemplary rule to present to this museum every first specimen of a species new to the fauna of the country. All regions of the country and almost every collector are represented in this museum.

Zoologisches Institut der Universität, Åbo (Turku).—Extensive material from all parts of Finland which includes, among others, a considerable part of the collection of J. Sahlberg (further material in Saalas' collection) and also material from Ehnberg, Linnaniemi, Merisuo, Putkonen, Rajalin, Sorsakoski, Ulvinen, Valle, and others.

Lantwirtschafts- und Forstzoologisches Institut der Universität, Helsinki.—Considerable material from various collectors (Listo, Poppius, and others) from all parts of the country.

Museum Kuopio.—Mainly older material.

Svenska Normallyceum (High School), Helsinki.—Helenius' collection, from Sa and Ob.

## 23 Russian Sector

Considerable material from this subregion is included in this public collections noted above, as well as in the private collections in Finland listed below. Unfortunately I was not able to utilize the undoubtedly extensive material housed in the Zoological Museum, Leningrad. Only occasional published findings by Russian scientists have been taken into account.

## C. Private Collections

Collectors whose material has been given to public or private collections other than those included here, have not been mentioned. The profession of the collector is given in his native tongue. Large collections are indicated by an asterisk (\*), and especially extensive collections by two asterisks (\*\*).

## Sweden

Almgren, E. Hästveda.—Small collection from Hls.

Arnberg, J.A. Telegrafkommissarie. Sollefteå.—From Gtl, Ång, and other areas.

Arvall, H. Bankdirektör. Vänersborg.—From Skå, Hll, Vgl, Dlr.

Arwidsson, Erik. Husdjurskonsulent. Luleå.—From Skå, Sdm, Upl, Lappl.

Backlund, Helge O. Fil. lic. Zool. Inst., Lund.—Coastal beetles from southern Sweden.

Bergwall, J.R. Revsund.—Chiefly from Jtl; also from Gtl, Lappl., etc.

Borgvall, T. Banktjänsteman. Linnégatan 45, Göteborg.—Possesses part of the collection of N.J. Wiberg from Göteborg (rest of Wiberg's collection preserved in Göteborg Museum).

Brinck, Per. Amanuens. Zool. Inst., Lund.—Chiefly from Skå and Hjd.

\* Bruce, Nils. Tullförvaltare. Idungatan 7, Stockholm.—Mostly from Öld, Sdm, Mdp, Ång, and Tol (large part in the Riksmuseum, Stockholm).

\* Brundin, Lars. Fil. dr. Martinvägen 50, Ängby (near Stockholm).—From various parts of the country (large part in Lund Museum).

Cedergren, Gösta R. Läroverksadjunkt. Skellefteå.—From southern Sweden, Hjd, and Ång.

- 24 Christoffersson, Harry. Fil. kand. Handskmakaregatan 4, Lund.—Chiefly from Skå (particularly *Harpalus* and *Amara*).

Dahlgren, K.V. Ossian. Docent.—Small collection from Upl and Vst.

Ek, R. Stationsinspektör. Mellerud.—Collection of the late L.J. Fredberg from Dsl.

Erlandsson, Stellan. Fil. dr. Sibyllegatan 7, Stockholm.—Mostly from Vgl, Öld, and northern Sweden.

Ernvik, Arvid. Folkskollärare. Gränsjön, Arvika.—Small collection from Vrm.  
Fahlander, Kjell. Lektor. Luleå.—Small collection from Upl and Jtl.

\* Fogelqvist, G. Överlärare. Halmstadt.—Chiefly from Hll.

Forsslund, Karl-Herman. Fil. dr. Skogsförsöksanstalten, Experimentalfältet.  
—Mostly from Dlr.

Freundin, H. Läroverksadjunkt. Borlänge.—From Dlr.

Fries, Einar, Banktjänsteman. Skandinaviska Banken, Stockholm.—Mostly from the Stockholm region.

\* Gauntitz, C.B. Agronom. Österkorsberga.—Extensive material collected by him and his brothers, Sven and Daniel, principally from Små and Lyl, but also from other parts of southern Sweden.

Heinze, Vilhelm. Med. lic. Inspektörsgatan 7, Hälsingborg.—Mostly from Skå.

Heqvist, Karl-Johan. Bodarna, Hällnäs.—Chiefly from Vbt.

Holm, Åke. Docent. Zool. Inst., Uppsala.—From Ble, Upl, Jtl, Lappl., etc.  
Carabids in the Lindroth collection.

Höjding, Birger. Rostock, Enebyberg.—Mostly from Gtl, Upl and Lappl.

\*\* Jansson, Anton. Redaktör, fil. dr. Gasverksgatan 32, Örebro.—Very large collection from all parts of Sweden. Also contains considerable material from L. Haglund and Lohmander.

Kihlstedt, Ragnar. Tandläkare. Sturegatan 10, Stockholm.—From Dlr and Vst.

Kinnmark, Folke. Med. lic. Vanadisvägen 22 B, Stockholm.—Mostly from Öld, Vgl, and Nbt.

Kjellander, Eric. Amanuens. Zool. Inst., Lund.—From Vgl.

\* Klefbeck, Einar. Läroverksadjunkt. Falun.—From Skå, Boh, Vgl, Dlr, Hjd, etc.

- 25 Kolthoff, Kjell. Konservator. Elfgårde, Rasbo.—Mostly from Öld, Upl, Dlr; partly collected by his son, fil. kand. Gustaf K.

Landin, Bengt-Olof. Stud. Djursholmsvägen 3, Stocksund.—From Upl, Vrm, Hls, Jtl, Tol, etc.

Leffler, Nils. Horred.—Small collection from Hll, Vgl, Dsl, Boh, etc.

Lindgren, Lennart. Compagniegatan 10, Hälsingborg.—Mostly from Skå and Små.

Linnman, Nils. Fil. kand. Kammakaregatan 29, Stockholm.—From Gl, Sdm, Upl, etc.

Neander, Alvar. Folkskollärare. Älmeboda.—From Skå and Små.

Nyholm, Tord. Amanuens. Zool. Inst., Lund.—From Skå and various other provinces of southern Sweden.

\* Olsson, Axel. Folkskollärare. Folkungagatan 146, Stockholm.—Mainly from Dlr, and Stockholm region.

Ottander, Axel. Distriktsveterinär. Smedjebacken.—From Sdm, Upl, and Dlr.

\*\* Palm, Thure. Jägmästare. Bispfors.—Very large collection from all parts of the country.



Palmqvist, Sven. Kemigraf. Församlingsgatan 4, Hälsingborg.—From Skå.

\* Ringselle, G.A. Läroverksadjunkt. Hedemora. Died in 1944.—From Hll, Upl, Vrm, Dlr, etc.

Salvén, Nils. Jägmästare. Falun.—From Dlr, partly collected by his brother Folke.

\*\* Sjöberg, Oscar. Provinsialläkare. Los.—From almost all parts of the country, particularly from Hls.

Sperber, I. Fil. lic. Zool. Inst., Uppsala.—From Upl and Dlr.

Sundholm, Arne. Tandläkare. Karlskrona.—Chiefly from Ble.

Svensson, Gösta. Apotekare. Vänersborg.—From Vgl, Dsl, and Vrm.

Tjeder, Bo. Banktjänsteman, Falun.—Chiefly from Dlr.

Tjeder, Tord. Landsfiskal. Brovallen.—From Dlr.

Welander, Arvid. Folkskollärare. Bodafors.—From Små and Nke.

Welander, Elving. Folkskollärare. Ramshult, Verlebo.—From Små.

Wieslander, Edgar. Advokat. Ludvika.—From Små, Öld, Nke, Dlr, etc.

\* Wirén, Einar. Lektor. Lundsberg.—Mostly from Öld, Vg, Upl, Vrm, Hjd, and Lul.

26 Wängsjö, Gustaf. Fil. lic. Paleontol. Inst., Uppsala.—Mostly from Ögl.

Zernander, Albin. Furulid, Ulvsby. Died in 1944.—Small collection from Vrm.

\* Agren, Olof W. Ingeniör. Brevik, Lidingö.—A collection gathered mainly by his late father, C.G. Agren (Göteborg) in Hll, Vgl, Boh, etc.

Swedish material is also found in the collections of Lindberg (from Skå, Boh, Sdm, etc.), Saalas (from Vrm), and Wellenius (single specimens from Gtl and Sdm)—all in Finland. A small collection gathered by I. and B. Rensch in northern Sweden was included in K. Zimmermann's collection, Berlin-Buch.

## Norway

Hanssen, K.H. Lektor. Hvalstad.—Chiefly from southeast Norway.

\* Jensen, Fritz. Postboks 115, Stavanger.—Particularly from western and northern Norway.

\*\* Strand, Andreas, Fuldmægtig. Telegrafstyret, Oslo.—From all parts of the country.

Material from Norway is also found in the Lindroth collection, as well as in the collections of Klefbeck, Lindberg, Palm, Sjöberg, Stenius (Helsinki), and in a small collection made by I. and B. Rensch which is included in K. Zimmermann's collection, Berlin-Buch.

## Finland (and Russian Sector)

Backlund, Helge O. Fil. lic. Zool. Inst., Lund (Sweden).—Mostly coastal beetles.



- Berg, Alex. Fil. mag. Savailagatan 3 B, Helsinki.—Mainly from Sa.
- Blomberg, Harald. Doktor. Elisabetsgatan 12, Helsinki.—From southern Finland.
- Blomqvist, Gunnar. Ingeniör. Joutseno.—From Sa.
- Carpelan, Jarl. Forstmästare. Furuvägen. 1 B, Helsinki.—Particularly from Ok.
- \* Elfving, Rabbe. Forstmästare. Mariankatu 10, Kuopio.—Chiefly from southern Finland, particularly St.
- 27 \* Grönblom, Thorwald. Direktör. Puutarhakatu 15, Tammerfors.—Particularly from Ta.
- \*\* Hellén, Wolter. Fil. mag. Zool. Mus. der Universität, Helsinki.—From almost all parts of the country, as well as the Russian sector.
- Hemdal, Dag. Redaktör. Päivärinkatu 7 A, Helsinki.—Small collection from Russian Karelia.
- Holmquist, Eric. Fjälldalsgatan 10 A, Helsinki.—Mostly from Helsinki region.
- \* Kangas, Esko. Fil. dr. Aggelby (Oulunkylä).—From all parts of the country as well as Russian Karelia.
- \* Karvonen, Viljo. Doktor. Norra Magasinsgatan 7 A, Helsinki.—Mostly from southern Finland and Russian Karelia.
- \*\* Krogerus, Rolf. Fil. dr. Kasärngatan 2, Helsinki.—From all parts of the country. Also material from Russian Karelia (collected by his son, fil. mag. Harry).
- Lahtivirta, Kalervo. Fil. mag. Kansanopisto, Orivesi.—Chiefly from Ik and Ta.
- \*\* Lindberg, Harald. Fil. dr. Estnäsngatan 7 E, Helsinki.—Very large collection from all parts of the country, collected by himself and his two sons, fil. dr. Håkan and fil. mag. Per Harald.
- Numers, C. von. Doktor. Skillnadsgatan 11 A, Helsinki.—Particularly from Sa.
- \* Palmén, Ernst. Fil. dr. Mannerheimvägen 16 A, Helsinki.—From various parts of the country, also from Russian Karelia.
- Perttunen, Vilho. Stud. Tölögatan 30 B, Helsinki.—Particularly from Ka and Ik.
- \* Platonoff, Stephan. Fil. mag. Ulrikasborg. Erunnsparken, Helsinki. Died in 1944.—From various regions, particularly northern Finland and Russian Karelia.
- \* Pohjola, Mauno V. Forstmästare. Keuru.—From southern and central Finland, and Russian sector of the Isthmus of Karelia.
- \* Renkonen, Olavi. Fil. dr. Stora Allén 2 B, Munksnäs, Helsinki.—From various regions, including Russian Karelia.
- Rosendal, G. Godsägare. Henriksberg, Hangö.—From Nl and Oa.
- \* Saalas, Uunio. Professor. Annegatan 29, Helsinki.—From all parts of the country, including Russian Karelia, partly collected by his father, John Sahlberg.

- \*Saarinen, Arvi A. Prokurist. Stora Parkvägen 11 A, Munksnäs, Helsinki.  
—Particularly from Ta, Tb, and Oa.
- 28 \*Stenius, Gunnar. Arkitekt. Sandviksgatan 4, Helsinki.—From all parts of the country.
- \*Stockmann, Sten. Direktör. Skepparegatan 6, Helsinki.—From various parts of the country.
- Stora, Ragnar. Rektor. Nykarleby.—Chiefly from Nl, Om, and Lp.
- Suomalainen, Hannu. Fil. mag. Fänrik Stålgatan 5 B, Helsinki.—Particularly from Sa.
- Thuneberg, Erik. Doktor. Joutseno.—Particularly from Ik, Ka, and Sa.
- (\*)Wegelilus, Axel. Lektor. Sanduddsgatan 19, Helsinki.—His important collection from different parts of the country was destroyed during the winter war in Viborg.
- \*Wellenius, Otto. Doktor. Ekenäs.—From southern Finland and Sb.

A satisfactory arrangement of material could be done only for Sweden. A card index was made in which all the carabid localities known to me were sorted into provinces, and the date, collector, and depository of voucher specimens noted. This index will be transferred to the Naturhistorisches Museum in Göteborg after the publication of this book.

For Norway, all the additional localities were incorporated in a copy of the catalog by Munster and sent to Andreas Strand for his inclusion in the original catalog.

For Finland and the Russian sector, only separate lists of various collections are available. These will be given to the Zoological Museum of the University of Helsinki for the benefit of future researchers.

The entire information compiled from the above-listed sources is unfortunately disproportionate in distribution throughout the Fennoscandian region, a fact readily apparent from the maps given in Part II. The most detailed distribution of carabids was available for Sweden. In Finland, these insects were labeled in part with only the parish name, which is quite inadequate since some cover considerable territory, particularly in the north. As for Norway, the collecting of carabids has not been very extensive.

- 29 An equal distribution of collecting intensity is indeed an unattainable objective, but nonetheless one worth striving for. One of the principal reasons for presenting here the information collected to date is to show that further research in Sweden would only accentuate the present disparity. It should come as no surprise to the reader that the Swedish distribution has been treated in somewhat greater detail compared to other countries, or that the Swedish material constitutes the primary basis for comments on ecology, biology, etc.

## CHAPTER III

# The Species

\**Abax ater* Vill.

(*striola* Fabricius, *parallelepipedus* Pill. and Mitt. nec Dej.)

Distribution  
(map in BCH 1938, no. 40)

*Sweden*: Exclusively found in the northwestern coastal region of Skåne between Kullen and Ramlösa. First discovered by Fallén (1802, p. 7) and subsequently, sometimes not infrequently, recorded in several localities. Recently collected in 1938 and 1939: Pålshö (KLF), Kulla-Gunnarstorp (HZE), Mölle (HZE).

*Norway*: Recorded at only two places: 2 Vestre Aker, Etterstad, 1 specimen (MOE, from SHY 1879, p. 18); 3 Brevik, numerous specimens (MST, from SHY l.c.; 7 specimens, MO).

*Finland and Russian sector*: No records.

*Adjacent regions*: Nearest localities situated in Denmark, where the species is not rare, at least in Sjaëlland and eastern Jylland, but is not found on Bornholm (West 1940, p. 41). Not known from Estonia or Leningrad region, but recorded in eastern Latvia (ULN 1884, p. 12); an old doubtful specimen from "Livonia" (SDL 1872, 1891). British Isles (Joy, 1932, p. 358); frequent in Ireland (JHS and HLB, 1902, p. 573).

*Total area*: A solely European species. Predominantly western, distributed south as far as northern Spain (FUE 1920, p. 162), central Italy (LUI 1929, p. 123), Serbia (APF 1904, p. 215). East as far as Poland (LMN 1913, p. 58) and Kiev (JAC 1905–1908, p. 353). According to BOD (1927c, p. 41) also found in Iran, which appears improbable.

### Ecology

Judging from the scant information available in Sweden, restricted to beech forests. No ecological data available from Norway. In Central Europe found

\*Map of distribution given in Part II.

- 31 exclusively in forests and, at least in the northern plain of Germany, especially in beech forests (Dahl 1928, p. 128; GRD 1937, p. 44); in Denmark contrarily, often found in mixed forests (LRS 1939, p. 404). The species requires shade and high soil moisture; in Mecklenburg, for example, it occurs in dark beech forests without ground vegetation (GRD l.c.) and is therefore found below rich leaf litter, in moss, in tree stumps, etc. According to WHF (1881, p. 26), found on "loamy (limy, argillaceous) soil"; the need for limestone has also been mentioned by Dahl (l.c.).

### Biology

The adult is found year-round, but is more abundant during early summer. The few Swedish catches are distributed as follows: II: 1; III: 0; IV: 3; V: 10; VI: 6; VII: 2; VIII: 1; IX: 2; X: 1. In Denmark found mainly in May as well, with larvae sighted almost year-round. Autumn breeder. Last instar larvae hibernate, as well as old beetles (LRS 1939, p. 403). In Germany, newly emerged beetles appear in late summer (BKH, E.B. 1910, p. 267); it is therefore possible that they breed only in the following summer and that development actually takes two years (contrarily, compare LRS l.c.). The larvae recorded in mole tunnels (RSB, E.M. 1913, p. 41) were probably an accidental find.

Diet: Unidentified species of *Abax* have been observed feeding on slugs (KRS 1905, p. 129) and crucifer pods (KLE, E.B. 1912, p. 282).

### Dynamics

Wings very short, elytra fused along the suture. Insect is therefore entirely confined to the ground and as a stenotopic forest dweller has a very restricted capability of dispersal, at least in highly cultivated regions.

### Variation

The species is divided into several subspecies in Central and southern Europe (SBR, C.C. 1927, p. 123), the *forma typica*, however, occurs in our region, Denmark, and northern Germany.

### Fossil Records

Denmark, postglacial (HNR 1933, p. 140). England, postglacial; Ireland, undetermined age (Bell, 1922, p. 51); Galicia, glacial (SCL 1916, p. 50).

- 32 *Acupalpus brunneipes* Sturm (*brunnipes* auct.) was erroneously reported from Sweden (THS 1859, p. 289; MLG 1863, p. 42; Roth, E.T. 1897, p. 133; Palm, E.T. 1931, p. 33). In each case, dark specimens of *dorsalis* were involved. *A. brunneipes* does not occur within the region (neither in Denmark; see West 1940, p. 30).



*\*Acupalpus (Anthracus, Balius) consputus* Dft.  
(*dorsalis* Thoms. nec Fbr., Gyll.)

Distribution

*Sweden*: In western Skå, on Öld and Gtl distribution moderate but highly local and generally rare. Furthermore single records from Ble Ronneby (LUG, 3 specimens coll. LTH); Hill Edenberga (MRT, 2 specimens, MG!); Slåp, numerous specimens (SDN, MG!); Små Kalmar (WLN, LG! P. Lundquist, LU! Leg. ?, RM!); Ögl Linköping, May, 1918, 1 specimen (SLL, RM!).

Erroneous: Jtl (MRT, 1 specimen, MG!); definitely a wrongly labeled specimen from Hill (see above).

*Norway*: No records.

*Finland*: Known only in the last few years and only from the extreme southwest; certainly a late immigrant. NI Hangö, June 1936, 2 specimens (Karling, N.E. 1937, p. 153; MH!); Tvärminne, sea drift, 1939, 1 specimen (PME, S.H.A. 1940, p. 81!); Snappertuna, 1939, 2 specimens (PME l.c.); Ab Lojo, Storön, in *Typha* swamp, June 7, 1942; 4 specimens (KRG, N.E. 1943, p. 168).

*Russian sector*: No records.

*Adjacent regions*: Distributed in the southern part of Denmark but not frequent (West 1940, p. 30). From Estonia only one late record, at Kiilaspere on the Konuvere River, June 9, 1938, 1 specimen (MIL). Also in eastern Latvia (ULN 1884, p. 14). Absent as far as I know in Leningrad region. British Isles, only in England (Joy 1932, p. 355).

*Total area*: Palearctic species. In Europe south to northern Spain (FUE 1919, p. 139), Corsica (DEV 1935, p. 44), southern Italy and Sardinia (LUI 1929, p. 92), Bosnia (APF 1904, p. 208). East as far as southern Russia (SBR, C.C. 1928, p. 85). The Caucasus (RTT 1900; LSH 1936, p. 208). Western Turkestan (CKI 1927–1933, p. 1257). Western Siberia (HEY 1880–1881, p. 47).

Ecology

33 Stenotopic riparian† species, but always found around very small bodies of water, mostly ponds and puddles, and rarely along rivulets which often dry up in summer. Requires moderate shade of deciduous trees or shrubs. All records from loamy soil and hence possibly requires limestone. Lives at very edge of water under wet leaves in places that are negligibly overgrown or bare. Typical habitat: Gtl Källunge, “Prästängen,” May 23, 1940, at a small pond that would certainly dry up in summer, situated in a luxuriant open deciduous forest meadow; weak shade of solitary oaks and birch; specimens found among rotting leaves and grass at water line, on soft loamy-humus

† (= ripicolous; suppl. scient. edit.).



soil. Successive species: *A. exiguus*, *Bembidion clarki*, *Pterostichus anthracinus*, *Agonum livens*, and others (LTH). The few records from foreign countries provide no additional information.

### Biology

A distinct early summer species. The few Swedish catches distributed as follows: III: 1; IV: 2; V: 5; VI: 7; VII: 10; VIII: 0; IX: 0; X: 1. A sudden decline in August is also evident in Denmark (LRS 1939, p. 344). It is therefore a spring breeder, hibernating as an adult (l.c., p. 422).

### Dynamics

Wings fully developed. Flight observation: Ögl Lindköping, May 1918 (SLL, RM!). Capability of dispersal therefore well developed.

### Variation

The Fennoscandian material is uniform and consists solely of *forma typica*. Various subspecies have been reported for Central and southern Europe, the Caucasus, and western Turkestan.

\**Acupalpus* (s. str.) *dorsalis* Fbr. (nec Thoms.)  
(*gyllenhali* Thoms., *brunnipes* Thoms. nec *brunneipes* Sturm,  
*thomsoni* Roth.)

### Distribution

*Sweden*: Southern species and fairly uniform in distribution. Northernmost finds occurred in Dlr, as far as Orsa, June 1908 (UYT 1909, p. 208, and in litt.) and Rättvik, May 31, 1936 (KLF!), in addition to Gst Storvik (JNS) and Vrm Rottnen (SVS!). There are no actual gaps in distribution, but the species is more abundant in coastal and loamy regions, especially around Lake Vaner.

34 *Norway*: Occurs exclusively in the southeast, where its distribution is uninterrupted between the Swedish border and 5 Mandal (MO!). Its northernmost locality is isolated: 10 Elverum, Grundset (SIE 1875, p. 106).

Erroneous: Dovre and Tromsö (SIE l.c.; no voucher specimens and not accepted by MST).

*Finland*: Widely and continuously distributed south of latitude 62° N. Northernmost localities occur in the Bothnian coastal area and fairly isolated: Om Jakobstad (SBJ, MH!); Haapavesi, 2 specimens (HEL, NL!). In the east extends north as far as Tb Joensuu (ELF).

Doubtful: "Lapponia" (KLS from SBJ 1873; p. 134; PMJ, MH!); LK Muonio (SBJ, MH! Not mentioned by SBJ 1871b and 1873, and the specimen is possibly a record from KLS; see *Bembidion ustulatum*).

*Russian sector*: Found in the extreme south, on the Swir River (several localities and collectors!), and near Vitele on Lake Ladoga (KNG! SAA!).

*Adjacent regions*: Widely distributed in Denmark and fairly frequent on Bornholm also (West 1940, p. 30). Also Estonia (RHL 1906; SUM 1931; HAB in litt.), Latvia (SDL 1872; ULN 1884), and Leningrad region (OBT 1876). British Isles (Joy 1932, p. 356), also Ireland (JHS and HLB 1902, p. 566).

*Total area*: Possibly a Palearctic species. However, since it has only recently (MÜL 1933) been definitely separated from related species, it is likely that some of the following reports actually pertain to its relatives: Europe south as far as southern Spain (FUE 1919, p. 138), southern Italy including Sardinia, Sicily, Malta (LUI 1929, p. 91), Greece and Crete (OTZ 1886, p. 210). East as far as Ural (JAC 1905–1908, p. 386). Northern Africa (BED 1895–1914, p. 157). Madeira and Canary Islands (JEA 1941–1942, p. 718). West Asia, east as far as western Turkestan (HEY 1880–1881, p. 47; 1896, p. 21; APF 1904, p. 206). The Caucasus (CHD 1846, p. 187; SDR and LDR 1878, p. 82; LSH 1936, p. 141). In Siberia (from CKI 1927–1933, p. 1246) subsp. *pallidus* Motsch.

### Ecology

Definitely a riparian species, but also found at quite some distance from water if the soil is sufficiently moist. Mainly found around large lakes, but also reported for small and very small water bodies as well as for moderately fast-  
 35 flowing waters. The banks are always more or less overgrown, mostly with *Carex* (also *Equisetum*) but the carabid prefers small open places, where it often occurs gregariously. The habitat is usually directly exposed to the sun, and only occasionally shaped by *Salix* and other such plants. Soil conditions vary (PME and PFF 1943, p. 143), but a more or less strong admixture of loam seems to be preferred (even though peat bogs are sometimes inhabited as well). Sometimes found with *A. flavicollis* in riparian biotopes typical of that species. The occasional en masse occurrence on the seashore, and also on completely barren lakesides, is undoubtedly only coincidental. According to Dahl (1928, p. 167) requires humic acids, a statement I do not understand. Hibernates on drier soil, as do most riparian carabids, for example, in shore forests (SBJ 1873, p. 134; Dahl l.c.; LTH).

### Biology

A very distinct early summer species. Swedish catches: I: 1; II: 0; III: 6; IV: 15; V: 27; VI: 70; VII: 15; VIII: 3; IX: 6. Immature beetles July 22 and 23, 1933

in Dsl (LTH). Catches in Denmark correspond with the foregoing (LRS 1939, pp. 344, 421). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Spontaneous flight: Ögl Motala, April 28, 1934 (LTH); numerous observations also from Central Europe (HST, E.N. 1876, p. 79; JNN 1905, p. 176; CAI 1908; p. 137; WGN in litt.). The occurrence of large numbers in sea drifts in Finland (Frey 1937, pp. 420, 436; PME 1944, p. 38) indicates a good capability of dispersal.

### Variation

Highly variable in color; nevertheless only var. *södermani* Hellén (N.E. 1922, p. 85) has been described from the region. The darkest specimens are almost uniformly black and have been identified partly as *brunneipes* (see above). The palest specimens have a uniformly reddish-yellow pronotum and occur particularly on Gtl (erroneously published under the name *elegans*; see the latter species). Correspondingly, dark specimens are somewhat more frequent in western Sweden. These modifications are undoubtedly due to climate (possibly atmospheric humidity).

36

### *Acupalpus* (s. str.) *dubius* Schilsky (*luridus* auct. nec Dej.)

### Distribution

*Sweden*: Only two specimens known from the extreme southwestern part of Skå: Kämpinge, April 1886 (PTT, coll. THS, MB!). Probably drifted by the wind.

Not known in the rest of Fennoscandia.

*Adjacent regions*: In Denmark recorded near Tisvilde in northern Sjælland and from two localities in Esbjerg region (West 1940, p. 30). Not found in the Baltic States nor in Leningrad region. British Isles, including Ireland (HOR 1941, p. 239).

*Total area*: Euro-Caucasian species. Recorded to date south as far as southern Germany (HOR 1941, p. 239) and southern France (DEV 1935, p. 43); east as far as upper Silesia (HOR l.c.). The Caucasus (MÜL 1933, p. 204). Distribution not completely known due to earlier confusion with *luridus* Dej., which was conclusively resolved for the first time by MÜL (l.c.).

### Ecology

Observations available only from Germany. The species lives on humid, more

or less shady ground, mainly on banks of ponds and pools, in moss, under leaf litter and needles. Often found in *Sphagnum* in hill moors (HOR 1935a, p. 54; GRD 1937, p. 48; MÜH in litt.), and in beech forests (GRD l.c.; MÜH in litt.); prefers loamy soil (Dahl 1928, p. 166). Occasionally found together with *flavicollis* (Dahl l.c.; DTZ 1939, p. 57).

### Biology

In Denmark seen especially in July, and an immature specimen found also in this month; probably breeds in spring and hibernates as an adult (LRS 1939, pp. 344, 421).

### Dynamics

Wings fully developed and undoubtedly with flight capacity, but corroborative observations absent to date.

- 37 *Acupalpus elegans* Dej. was wrongly reported from Gtl (E.T. 1924, p. 146), based on its confusion with the pale form *dorsalis*. On the other hand, two specimens were found in Denmark many years ago (Sjælland) (West 1940, p. 29).

\**Acupalpus* (s. str.) *exiguus* Dej.

### Distribution

*Sweden*: Only in the south, scattered and usually rare. Several localities in western Skå, but numerous only around Palm near Skanör, May 4, 1937. Ble Nävrågöl, June 20, 1939, 1 specimen (SDH!); Rödeby, May 30, 1943, 1 specimen (BRK!). Små Kalmar, collected by several entomologists in earlier years (AHT, HGL, WLN), and recently by SDH, April 19, 1942, 1 specimen; Älméboda, June 16, 1924 (BRD!). Öld (MRT, SDN, BRC, LTH), only in the Halltorp region as far as is known. Gtl, conspicuous in May 1940, but found in three localities (LTH); Hörsne, Simunde (see below), frequent; Källunge, 3 specimens; Gothem, 2 specimens. Recorded again in Gothem, 1 specimen by LNM, April 23, 1941, and newly discovered from the island L. Karlsö, May 1941, 1 specimen, Hil Släp (SDN: "I found some specimens of this species in June 1918 and 1920 near Vildmossen and at the river near Hagryd Dala," SDN Mskr.; 5 specimens, MG! AGR!). Vgl (coll. THS, 1 specimen, ML!), Råda near Göteborg (ERC, 1 specimen, MG!); Vänersborg (HCK, 1 specimen, VM!). Dsl Bolstad, July 23, 1933, 1 specimen (LTH). Ögl St. Anna, Sporrhölmén, June 21, 1942, 1 specimen (WSJ!). Sdm Nacka, Dammtorpssjön, April 2, 2 specimens, April 20, 1937, 2 specimens (WSJ!).

Interestingly, the three northernmost finds and those of Gtl have been made only in the last few years. The species is probably spreading.



*Norway*: No records.

*Finland*: Several localities in the extreme southwest. In the southeast, north as far as KI Parikkala (SBJ, MH!), west as far as Ka Virojoki (PFF). The western locality of Ta Sääksmäki is isolated, and the species has been found here repeatedly by several collectors (MH! MÅ! etc.). Also in Houtskär in Åbo Skärgård (Salmela, MÅ!), and isolated in Al Eckerö, Storby, June 7, 1943 (LBÅ). It remains to be seen whether the gap on the southwestern coast actually exists.

*Russian sector*: Only five localities in the extreme south at the Swir River (several collectors!).

- 38 *Adjacent regions*: In Denmark in eastern Jylland and on several islands, including Bornholm (West 1940, p. 30). Strangely, not recorded to date in Estonia and Latvia. (The name of the species was inadvertently printed in bold type—SDL 1891, p. 59; see RHL 1905, p. 9). Leningrad region (OBT, 1876). British Isles, only England (Joy 1932, p. 356).

*Total area*: Palearctic species. In Europe, south as far as the Pyrenees and the Balearic Islands (FUE 1919, p. 139); also widely distributed in France (DEV 1938, p. 450), Corsica (DEV, l.c.), southern Italy including Sardinia and Sicily (LUI 1929, p. 92), Greece and Crete (OTZ 1886, p. 210) Madeira and Canary Islands (LBL in litt.). The Caucasus (JAC 1905–1908, p. 386). Western and eastern Siberia (HEY 1880–1881, p. 47; JAC l.c.).

### Ecology

Occurs on marshy soil rich in vegetation, mostly on banks or near ponds and puddles. Found in very large numbers (in hundreds): Gtl Hörsne, Simunde, by edge of an overflowing loamy duck pond. The carabids ran freely on the wet unshaded soil between low but rather thick vegetation of *Ranunculus repens*, *Carex vulpina*, sterile grasses (*Glyceria* ?), etc. Successive species: *Dyschirius lüdersi* and *Bembidion obliquum* (dominant), *B. assimile*, *Aphodius plagiatus immaculatus* D.T., etc. In Denmark and Central Europe mainly at forest swamps (NBG 1929, p. 125; West 1940, p. 30), but also found on wet meadows and on marshy soil (ROU 1934, p. 79). In England detected on river banks (FWL 1887, p. 38).

### Biology

Distribution of the few Swedish catches: III: 2; IV: 6; V: 9; VI: 7; VII: 1; VIII: 0; IX: 1; X: 0; IX: 1. In Denmark likewise an exclusive spring species; adults hibernate (LRS 1939, pp. 344, 422), which has also been observed in Central Europe; larvae in April (BLK 1925, p. 26). Feeds on rolled oats in captivity (BLK l.c.).



## Dynamics

Wings fully developed. One specimen from Gtl induced to flight upon exposure under glass to sun on May 24, 1940. Reports of spontaneous flight from Central Europe (HST, E.N. 1876, p. 79; BUR 1939, p. 182). In Finland 3 specimens found in sea drift (Frey 1937, p. 436; PME 1944, p. 38).

39

\**Acupalpus* (s. str.) *flavicollis* Sturm

## Distribution

(map in BCH 1938, no. 54)

*Sweden*: Principally in the southwest. Distribution apparently uninterrupted from western Skå (southern limit: Malmö, VNS, HM!) as far as southern Vrm. Northernmost localities: Dlr Rättvik, May 31, 1936 (KLF!); Sundborn Karlsbyn, Aug. 2–3, 1943, 2 specimens (KLF! TJB!); Gst Trösken (near the coast), June 5, 1916 (leg. ? RM!). East coast reached on the mainland only in Stockholm region and hence occurrences on Öld and Gtl appear isolated: Öld Högby, Vedby, June 1907, 1 specimen (WRN!); Byerum, seashore, June 5, 1943, 3 specimens (BRK!); Gtl När, 1 specimen, July 1923; Visby, 6 specimens, Tingståde, 12 specimens, Irevik, 1 specimen, May 1940 (all by LTH); Fårön, Sudersand, June 12, 1942, 1 specimen (BGW!). Two localities in the environs of Stockholm appear likewise isolated: Skanstull, June 6, 1901 (MJB, E.T. 1901, p. 191); Sdm Nacka, Dammtorpssjön, May 30, 1943, 1 specimen (SVS!).

*Norway*: Exclusively in the extreme southeast, but known from numerous localities. West as far as 4 Kragerö and Drangedal, Sandnes (MO!), north as far as 2 Vikesund and Hokksund (MO!).

*Erroneous*: 31 Bodö (Catalog MST). According to STA (in litt.) SPS has indicated that the species was collected by WRL, but it is missing from the WRL collections. It could well have been confused with *Bradycellus collaris*.

*Finland*: (map in PME and PFF 1943, p. 190): Discovered rather late in Finland (HLL, M.F.F. 1921, p. 33) but distribution now continuous in the southeast, north as far as Kb Hammaslahti (FA), and west as far as Sa Kristina (numerous collectors!) and Kuovola (KRV!). Far removed from the foregoing are the two reports for the Skärgård of NI Tvärminne (Frey 1937, p. 436; STÅ; PME) and in Al Jomala (HLL!).

*Russian sector*: Sv Vaaseni 1942, 1943 (KRV! PFF); Gumbaritsa; Segesa; Uslanka; 1943 (PFF).

*Adjacent regions*: Rather widespread in Denmark, also on Bornholm (West 1940, pp. 29–30). In northern Estonia two localities known (HAB in litt.); in Latvia found only near Libau (LCK in litt.). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 356).

*Total area*: Western Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 137), central Italy (LUI 1929, p. 91), European part of

Turkey (APF 1904, p. 205). East as far as Moscow and Kiev (JAC 1905–1908, p. 386). Azores (JEA 1941–1942, p. 721). Asia Minor (APF l.c.; BOD 1927a, p. 57). The Caucasus (RTT 1900, p. 135).

### Ecology

Found on lakesides but especially river banks, and in peat bogs. In the first two cases, soil generally consists of fine sand (more seldom loam) with a thin surface layer of mud. Example: Vrm Edsvalla, June 24, 1933, bank of Norsälven, short, low beach terrace a few decimeters above the water level; sparse short vegetation of *Juncus (articulatus ?)*, *Alopecurus aequalis*, *Agrostis* sp., fine sparse moss; no shade; soil with moderate moisture; found together with *dorsalis* (LTH). In Finland almost stenotopic for similar riverine biotopes (often with *Equisetum arvense*) (PME and PFF 1943, p. 143). Singly in sand pits on similar soil. Occurs less often in Swedish peat bogs, and here found on moist barren surfaces among *Sphagnum* hummocks. Contrarily, in Denmark and Central Europe such occurrences apparently typical (West 1940, p. 30; Dahl 1928, p. 168; ROU 1934, p. 76; HOR 1941, p. 237); thus the purported dependence of the species on humic acids (Dahl l.c.; NBG 1933, p. 59).

### Biology

Definitely an early summer species. Swedish catches: IV: 5; V: 17; VI: 34; VII: 7; VIII: 2. Immature beetles July 22, 1933 (Dsl), August 2 and 3, 1943 (Dlr). Corresponding conditions in Denmark; however, additionally found in autumn in small numbers (LRS 1939, pp. 344, 421). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight observations absent to date (my several attempts to induce flight upon exposure to sun under glass were not successful). This species recovered, however, from sea-drift material in Finland, in large numbers (Frey 1937, p. 436; PME 1944, p. 38), and near Öld Byerum (BRK!).

\**Acupalpus* (s. str.) *meridianus* L.

### Distribution

*Sweden:* Distribution distinctly discontinuous, which could be attributed on the west coast at most to insufficient investigation. Numerous localities in western  
 41 Skå and the Göteborg regions, secondarily on Öld and Gtl, and likewise in the region of Lake Malär between Upl Uppsala (several collectors!) and Ögl Linköping May 17, 1942 (LNM!). These occurrences in central Sweden should

be associated with those on the west coast, which is indicated by records from Nke Örebro (JNS!) and Vgl Mariestad 1936 (LTH). A more or less uninterrupted distribution from Skå to Öld is also possible, which emerges from the records in Ble Karlshamn 1941 (SDH!) and Små Kalmar (HGL, coll. JNS!).

Doubtful: Ögl Västra Ny (HGN 1853, p. 16).

Norway: Exclusively in the extreme southeast, especially around Oslo, north as far as 10 Grue in Solör (SIE 1875, p. 106), and as far as 15 Kongsberg (MST).

Erroneous: Dovre (SIE l.c.; probably confused with *Trichocellus cognatus*).

Finland: Definitely identified first in 1914, when a few specimens were found on a greenhouse in Djurgården, Helsinki (Frey 1915a, p. 13). Later repeatedly collected in and around the city (several collectors, MH! MÅ! and others), also near Ka Viborg (THG, PRT; also in WLL and SAR collections), and finally one specimen near Tb Keuru, 1943 (PHJ!).

Doubtful: Ik Sakkola (KRG, N.E. 1921, p. 114; no voucher specimen).

Russian sector: No records.

Adjacent regions: Widely distributed in Denmark, and not unfrequent on Bornholm (West 1940, p. 30). In Estonia four localities (HAB in litt.), of which one on the northern coast; Latvia (SDL 1872; ULN 1884; LBÅ 1932). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 356).

Total area: Western Palearctic species. In Europe, south as far as Portugal (FUE 1919, p. 137), Corsica (DEV 1935, p. 43), southern Italy, including Sardinia, Sicily (LUI 1929, p. 91), Greece (APF 1904, p. 206). Asia Minor (APF l.c.). Iran (BOD 1927c, p. 39). The Caucasus (CHD 1846, p. 187).

### Ecology

This species differs markedly from its congeners, partly because of a lower humidity requirement and partly due to pronounced synanthropy. The species lives on open and more or less loamy soil which is exposed to sunlight, especially at barren places in low but often dense grass or other vegetation.

- 42 The soil surface must not be completely dry, but proximity to open water is not mandatory. Frequent inhabitant in gardens or on cultivated lawns, even in cities; found many times, often gregarious, in grass and weed stacks. Limestone requirement seems likely, as indicated by foreign authors as well (Dahl 1928, p. 166; GRD 1937, p. 73). Found throughout the rest of Europe frequently in gardens (E.M.M. 1912, p. 152), fields (Dahl l.c.; HOR 1941, p. 238), and grass stacks (FWL 1887, p. 39).

## Biology

A distinct spring species. Swedish catches: III: 3; IV: 9; V: 22; VI: 20; VII: 16; VIII: 1; IX: 1; X: 2. In Denmark also found in autumn in small numbers, with larvae being observed in July (LRS 1939, pp. 344, 421). Spring breeder, hibernating as an adult (also observed in England; FWL l.c.). Reported in France "dans les nids de *Rattus norvegicus* ou de Compagnols" (JEA 1941-1942, p. 716), which appears rather fortuitous.

## Dynamics

Wings fully developed. Diurnal flight observed in France (CAI 1908, p. 138). Flight capacity also indicated by two specimens from sea drift near Öld Byerum on May 5, 1943 (BRK!), and the frequent occurrence of this species "in gas tanks" near Elberfeld (CRN 1884, p. 11).

## Variation

Rather variable in color. In rare cases (for example, one specimen from Helsinki, HLQ!) the pronotum is uniformly light yellowish-red. All variations in color are merely aberrations and geographically of no consequence.

### \**Aëpus marinus* Ström

#### Distribution

(map in JEA 1926, p. 444)

*Norway*: Exclusively in the southwest; eight localities between 6 Madla on the Hafrsfjord (N.E.T. 1920, p. 60) and Hitra Island in 26 (N.E.T. 1920, p. 60; 1923, p. 276). See also Ström 1783, p. 63; HLS 1915, p. 21; N.E.T. 1930, p. 338).

Not recorded in the rest of Fennoscandia, nor in Denmark, nor the entire Baltic Sea region.

43 *Total area*: Solely European species with very restricted distribution. Found only in the extreme west in coastal regions of the Atlantic Ocean: Widely distributed on the British Isles, including Ireland (Joy 1932, p. 342; JHS and HLB 1902, p. 588); France, south only as far as Bretagne (DEV 1935, p. 30).

## Ecology

Exclusively a seaside species, living in the tidal zone and regularly being submerged with high tide. In Norway found on shallow bays with sandy soil (probably containing loam, under medium-sized stones (HLS 1915, p. 19; MST, N.E.T. 1930, p. 338). In England also occurs in stacks of *Zostera* above the



high-tide boundary, and does not go as far down as *Aëpopsis* and *Micralymma* (Walsh, E.M.M. 1925, p. 148).

### Biology

Period of development not known. One may assume that this species, like the ecologically related *Aëpopsis robini* Lab., is an autumn breeder and therefore hibernates by and large in the larval stage. The species was observed in copulation during September (BUR 1939, p. 99). According to JEA (1926, p. 464), during floods air is stored in the sacs (dilatations of the tracheae).

### Dynamics

Wings completely atrophied. Dispersal of the insect must therefore take place exclusively through water currents and undulations of the sea.

*Agonum (Europhilus) aldanicum* Popp.  
(nec HLL, N.E. 1930, p. 75)

### Distribution

*Russian sector*: Only one specimen in the extreme east of the Kola Peninsula near Lj Ponoj (MST 1934, p. 78; MH!).

Erroneous: Confused with *consimile* by LBÅ (1927, p. 20; 1933, p. 108) and HLL (N.E. 1930, p. 75) and hence wrongly mentioned for Finland (see detailed taxonomic discussion by MST l.c.; also LTH 1943a, p. 64).

Absent in the rest of Fennoscandia and all of Central Europe.

44 *Total area*: Palearctic species. Described from the Lena region in Siberia (PPP 1906b, p. 36), but also found on the Kanin Peninsula (MST l.c.).

### Ecology

The only specimen from Ponoj was found in the *reg. alp.*<sup>†</sup> "in the mud of an overflowing stream" (HLL, N.E. 1935, p. 89). In the Kanin Peninsula found on both sides of the timber line "among *Sphagnum* in swamps and on the edges of banks of smaller lakes" (PPP 1909, p. 9, "*consimile*"). In Siberia the one specimen found was recovered from the sandy bank of the Lena River (PPP 1906b, p. 37). Biology of the species not known.

### Dynamics

Wings fully developed, and insect undoubtedly with flight capacity.

<sup>†</sup>(cf. page 436 of Part III: suppl. scient. edit.).



\**Agonum* (s. str.) *archangelicum* J. Sahlb.

Distribution

*Russian sector*: Exclusively on the White Sea coast in the southern parts of the Kola Peninsula, and in northern Karelia. Northernmost locality—Kantalaks (PPP 1905, p. 92), the southernmost—Suma (ENW, according to PPP 1899a, p. 16; MH!); east as far as Kusomen (LEV, according to PPP 1905; MH!). Also on Solowetsk Island (LEV, MÅ! FA!).

Not known for the rest of Fennoscandia and all of Central Europe.

*Total area*: Palearctic species. In Europe, outside the region, only in the northern Russia on the Kanin Peninsula (PPP 1909, p. 9), and in Mezen region (PPP 1908, p. 6). Western Turkestan and southern Siberia (RTT 1907, p. 69; PPP 1910a, p. 337; Puel 1938, p. 188).

Ecology

In Europe occurs exclusively on the shores of the Arctic Sea, especially under washed-up stacks of *Fucus* (SBJ 1873, p. 119; PPP 1905, p. 92).

Only south of the tundra, but on the Kanin Peninsula right up to timber line (PPP 1909). In Asia found inland in saline places (PPP 1910a). One may therefore assume that the species is halophilous or even a halobiont. Nothing more is known about its biology.

45

Dynamics

Wings fully developed in specimens from Fennoscandia as well as in one specimen from Central Asia. Undoubtedly with flight capacity.

Systematics

For the erroneous synonymy of *archangelicum* and *mülleri*, see LTH (1943a, p. 55).

\**Agonum* (*Platynus*, *Limodromus*) *assimile* Payk.  
(*angusticollis* Fbr.)

Distribution

(map in BCH 1938, no. 32)

*Sweden*: Continuous distribution in the south, especially towards the west. Northern limit forms an oblique line from the northernmost Vrm as far as the southernmost Vbt, and is represented by the following localities: Vrm Likenäs (Palm and LTH 1937, p. 119!). Dlr Lima (TJB, E.T. 1928, p. 26!); Orsa (UYT 1909, p. 298, and in litt.). Hls Ljusdal (SJB). Mdp Njurunda and

Sundsvall region (several collectors!). Jtl Ragunda (FRI, VA!); Bispgården (LTH and Palm 1934, p. 38!); Ång Österåsen (BRD!); Undrom and Mo (BRC, RM!); Örnköldsvik (LTH). Vbt Umeå, by the river, July 10, 1936, 3 specimens (LTH). Species very rare in eastern central Sweden and on Öld, and the gap south of Lake Mälaren could be genuine. Apparently absent on Gtl.

Doubtful: Gtl (JHN, 1 specimen, LV!; probably wrong labeling).

*Norway*: Widely distributed in the south and southeast, north as far as 24 Vågå (SIE 1875, p. 100); Dovre (SNR 1862, p. 327); 11 Rendal (NTV, MO!); west as far as 6 Bjerkreim in Dalerne (HLS 1915, p. 23). Contrarily, only two localities in the western part of the country: 6 Nedstrand in Ryfylke (HLS l.c.) and 19 Årdal in Sogn. Additionally, occurs farther north near 27 Trondheim and 28 Steinkjer (N.E.T. 1923, p. 276; 1937, p. 147); 30 Grong; 31 Vefsn (N.E.T. 1938, p. 84).

*Finland*: Decidedly southern distribution. East as far as Kl Sordavala (STN!); in the west substantially farther north near Ta Ruovesi (PHJ!); Oa Seinäjoki (PHJ!); Ylistaro (NDM!); Korsholm near Vasa (RDL, det. HLL). Recorded in Åland only once, near Eckerö (PFF). It is not certain whether an actual gap in distribution occurs on the southern coast between Helsinki and Fredrikshamn (PHJ).

46 *Russian sector*: Only one locality in the extreme south; Vaaseni near Swir (PPP 1899a, p. 15).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and very frequent (West 1940, p. 45). In Estonia, including Ösel, records are likewise numerous (HAB 1936a and in litt.). The same is true of Latvia (SDL 1872; ULN 1884; HEY 1903). Leningrad region (OBT 1876; JAC 1908). British Isles (Joy 1932, p. 366), also Ireland (JHS and HLB 1902, p. 577).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 201), southern Italy (LUI 1929, p. 134), Bulgaria (APF 1904, p. 289). Northeast as far as Pechora (SBJ 1898, p. 339). Asia Minor (BOD 1927a, p. 68). The Caucasus (CHD 1846, p. 132; SDR and LDR 1878, p. 69), Siberia (among others, SBJ 1880, p. 339), east as far as Lena (PPP 1906b, p. 35) and Amur (HEY 1880–1881, p. 28); northern Mongolia (PPP 1907d, p. 23).

### Ecology

In humid and shaded places, especially in the forest, but preferably near standing or running waters (small as well as large). Mostly in dense and preferably deciduous shrub forests (especially *Alnus glutinosa*) with a definite layer of mull and little herbage, under moss and bark of rotting stumps. Also not rare in true shore regions, like “dy”† soil, and found on wet, dark, often barren

† (= Swedish, means: muddy, slimy; suppl. scient. edit.).

spots under foliage and twigs. The species seem to avoid coniferous forests, an observation made also in Germany (GRD 1937, p. 44).

### Biology

Swedish catches: II: 2; III: 2; IV: 13; V: 34; VI: 55; VII: 32; VIII: 14; IX: 11; X: 4; XI: 1. Immature beetles July 28, 1933 (Boh). In Denmark the figure for June is significantly lower than that for the months immediately before and after (explained in part by the earlier development in that region); larvae found in June–September (LRS 1939, pp. 331, 396). Certainly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed, and apical part normal in structure but comparatively smaller, scarcely larger than in the much smaller (and markedly thinner) *A. livens*. Species with flight capacity but neither a good nor a regular flier. The  
47 only observation of spontaneous flight recorded to date: Boh Naverstad, July 2, 1944 (LDN). As a fairly eurytopic forest and shore insect, this species has nevertheless comparatively good capability of dispersal.

*\*Agonum* (s. str.) *bogemanni* Gyll.

### Distribution

*Sweden*: A rarity of the first order, which has not been collected again in the twentieth century. Earlier information: Små (BOH, according to GYL 1813, p. 697; THS 1859, p. 262; no voucher specimen). Vgl (2 specimens in coll. THS, MB! GYL 1827, p. 448: "Etiam in Vestrogothia jam pluries lectus, locis humentibus, sub lapidibus"). Boh (3 specimens, MG!, one of which bears the label "J. P-n" and was definitely collected by Petersson, who was working in the Naverstad region. According to a personal communication from SDN the species was known to him only from northern Boh). Hls (BOH, 4 specimens, RM! STH, 2 specimens, MG! Leg. ?, 1 specimen, VA! THS 1859, p. 262). Iggesund (WNG, E.T. 1880, p. 192; according to JNS there is a specimen labeled "Norrl." in KF). Lappl. ("Lapp. mer.," ZTT; "Lapp. bor.," BOH; RM!).

Doubtful: Nke Hammar (WNG, E.T. 1880, p. 192; only the above-mentioned specimen labeled "Norrl." present in KF).

*Norway*: No records.

*Finland*: Likewise extremely rare. During the twentieth century only one specimen found near Lk Kittilä (KRG!). Earlier found near Åbo (SBJ 1873, p. 121). In addition, only two records which refer to provinces: "Tavastia" (SBJ l.c.; MÅ!) and "Lapponia" (SBJ l.c.; MH!).

*Russian sector:* Only near Kn Jalguba, June 5, 1896, 1 specimen, under bark (PPP 1899a, p. 16; MH!).

*Adjacent regions:* Not found in Denmark and the Baltic States. On the contrary recorded in Leningrad region (OBT 1876); recently (1943) one specimen found by PHJ (!) near Lempaala in the Russian part of the Isthmus of Karelia.

*Total area:* Circumpolar species. In Europe, besides the north, found only in Austria (HDH 1924, p. 141; HOR 1941, p. 311), Switzerland (according to HOR l.c.), Bosnia (APF 1904, p. 289), and one specimen from Corsica (DEV 1935, p. 56). Siberia (HEY 1880–1881, p. 30; JAC 1905–1908, p. 330). North America, widely distributed (Leng 1920, p. 64; I examined one specimen from Newfoundland, coll. JNS).

48

## Ecology

There are only two reports from Fennoscandia, both Finnish. The species was found under bark (SBJ 1873, p. 121; PPP 1899a, p. 16), once on a coniferous tree. It is interesting to note that in Corsica and Austria this species (like *quadripunctatum*) is found in burned forests, and near Lunz even found in large numbers (HDH 1924, p. 141; JEA 1941–1942, p. 874). It is thus possible that the almost total extinction of this species in our region during the last decades could be related to a decrease in the clearing of woodlands by burning (Swedish svedjebruk). As far as I know there is no information on the period of development and other biological aspects.

## Dynamics

Wings fully developed. One flying specimen observed by PHJ in 1943 in the Isthmus of Karelia (Russian sector).

*\*Agonum (Europhilus) consimile* Gyll.

## Distribution

*Sweden:* Exclusively a fjeld<sup>†</sup> species. Southernmost record in Hjd Tännadalen, August 1938, on Skarvfjäll and Hamraffjäll, 1 specimen each (BRK!). Jil Vällistafjäll, August 1916, 1 specimen (RNG, coll. LTH); Jorm, Leipikvattnet, July 1, and Mesklumpen, June 30, 1932, 1 specimen each (JNS and Palm, E.T. 1936, p. 184, as *munsteri*!). In Lapland several localities (BOH 1844, p. 100; JNS 1926, p. 910; BRD 1934, p. 235; LTH 1935a, p. 40), with the southernmost record near Pil Svaipa, July 1936, 1 specimen (SWB, coll. Palm!); frequent in Abisko region.

<sup>†</sup>(= barren plateau of the Scandinavian upland; suppl. scient. edit.).



Doubtful: Vbt (WBG, 3 specimens, RM!).

Erroneous: Sdm Nacka (MCH, E.T. 1902, p. 194). Nbt (BOH, 1 specimen, RM = *gracile*!).

*Norway*: Partly in fjeld regions in the central southern part; southernmost record near 22 Mjösvatn (HLS 1891a, p. 17); northernmost record near 24 Fokstua in Dovre (several collectors!). Partly in the high north, from 34 Lofoten, Erikstadfjord in Lödingen (MST) as far as southern Varanger (several localities and collectors!); also reported for coastal regions.

Erroneous: 28 Innsjö (SBJ, RM = *munsteri*!).

*Finland*: Widely distributed in northern Lapland (SBJ 1873, p. 122; PPP 1905, p. 92; HLL, N.E. 1935, p. 89; and others!). South of latitude 68° N only three localities: Lk Muonio (SBJ, MH!); Ks Salla (ENW, MH!); Kuusamo, Paanajärvi (PFF 1943, p. 122). All reports from southern Finland refer to *munsteri*, which also pertains to the locality Ok Sotkamo (HLL, N.E. 1935, p. 89).

*Russian sector*: Only one locality in the southern part of the Kola Peninsula: Lv Kusomen (HLL!).

Erroneous: Kr Suma and Kn Saoneskje Unitsa (HLL l.c.; MH = *munsteri*!). Lj Ponöj (PPP 1905, p. 92, = *aldanicum*!).

*Adjacent regions*: No records.

*Total area*: Palearctic species. In view of the earlier confusion with *munsteri* (see MST 1934; HLL l.c.; LTH 1943a, p. 61), reports from other regions can only be used after re-examination of the material. The report from Kamchatka (BNN, NET, SBR 1929, p. 5; 1 specimen, RM!) is correct. Also in Pechora region (SBJ 1898, p. 339; Pjoscha, KLM NH!). The record from Kanin (PPP 1909, p. 9) pertains to *aldanicum*. Also see *munsteri*.

### Ecology

A common fjeld species, most numerous in the *reg. bet.*<sup>†</sup>, and sporadically but certainly an inhabitant of the *reg. alp.* also (Hjd, Jtl, Pil) (although not recorded to date in the northernmost parts). From the coniferous forest region, as far as I know, exists only one definite record: Lul Aktse, quaking land ("Bebeland") with *Carex limosa*, August 19, 1939, 4 specimens (LTH). This species is not a riparian one as believed earlier, but definitely a moor insect with no requirement for open water in its proximity, at least not in summer. Mostly found in clearings of birch groves in small, very wet swamp surfaces, particularly characterized by a dense, often hummocky moss cover (usually not *Sphagnum*). Example: Tol Björkliden, July 12, 1939, *Eriophorum polystachyum* moor in birch forest, with thin peat cover on loamy soil; numerous wet hummocks of *Cratoneurum falcatum* (det. Kotilainen); stepping

<sup>†</sup>(cf. page 436 of Part III: suppl. scient. edit.).

on the latter forced the carabid to appear in large numbers. Less numerous in another locality, the Abisko region (LTH) in *Carex aquatilis* moor with *Drepanocladus intermedius* (det. Kotilainen). In Norway, Fokstua, found in a swamp in a small birch forest where *Elaphrus lapponicus* apparently lives in early summer (LTH). In northern Finland in a *Carex eriophorum* swamp (LBÅ 1933, p. 108); according to PFF (1943, p. 96) typical of hypnum moss bogs ("Braunmoore").

### Biology

- 50 Collected from June to August. One immature beetle collected on August 19, 1939 (Lul Aktse). The species certainly hibernates as an adult.

### Dynamics

Wings fully developed. One carabid induced to flight upon exposure to heat in July, 1939 (Tol Abisko). One specimen found at the high-water level of a lake in northern Jtl (JNS and Palm l.c.), which indicates spontaneous flight.

*\*Agonum* (s. str.) *dolens* C.R. Sahlb.

### Distribution

(map in BCH 1938, no. 90)

**Sweden:** In the south rare and extremely local: several localities in central Skå. Hll Skottorp (MRT, MG!). Små Ryssby and Österkorsberga (GTZ!); Sandbäckshult (Palm). Vgl Mölndal (ERC, MG!); Norsesund (AGR!); Strängsered (LTH); Dagsnäs (Palm). Boh, southern end of Lake Bullaran (LTH). Ögl Linköping (SLL, VA!). Sdm Sätersta (OTT!). Upl Uppsala (several collectors!); Rasbo (KHK!); Älvkarleby (Palm). Vst Västerås (SDN, MG!). In the north from Vrm as far as Nbt not so scarce, on the banks of large rivers, locally even frequent, but does not reach the actual fjeld region. Northernmost localities in Tol: Vittangi (ZTT 1828, p. 36); Karesuando (BRC, RM!). It is not yet certain whether, as shown in the map of distribution, this species is actually absent from Ång and Vbt.

**Norway:** In the southeast widely and continuously distributed, especially along larger rivers, southernmost (and westernmost) near 4 Flaksvatn. Farther north only two isolated localities: 25 Röros (MST) and 28 Steinkjer (N.E.T. 1923, p. 276; 1937, p. 147).

**Finland:** Distributed throughout the country, but more frequent in the northern half. Noteworthy are the very rare occurrences in the Bothnian coastal region and the distributional gap along the southern coast; contrarily, found on the islands of Hogland (SRS, MH!) and Tytärsaari (HLL!) in the Gulf of Finland (in the latter locality immature specimens were also found and

hence the species might actually be a native of that region. On Åland only near Eckerö (LBÅ 1921, p. 32; MH!). Missing from the extreme north; delimiting  
 51 localities: Le Enontekis (STN!) and Li mouth of the Ivalojoiki River (PPP 1905, p. 92); Enare, June 12, 1937, 1 specimen (NDM!).

*Russian sector:* Not found in the tundra but recorded from the western and southern parts of the Kola Peninsula (PPP l.c.); east as far as Lv Kusomen (LEV, MH!). In southern Karelia two localities: Lake Kn Juustjärvi (SBJ, MH!) and Ko Vitele, 1942 (KNG! SAA!).

*Adjacent regions:* In Denmark only two localities: Esbjerg region and Bornholm (West 1940, p. 44), possibly a coincidental occurrence. Estonia and Latvia (SDL 1872, 1891; HAB in litt.). Leningrad region (OBT 1876). Not found on the British Isles (however, see *sahlbergi*).

*Total area:* Palearctic species. In Europe south only as far as Holland (EVS 1898, p. 71), central Germany (HOR 1941, p. 318), and Slovakia (ROU 1930, p. 187).<sup>1</sup> In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 310). Kirgizia (HEY 1880–1881, p. 29). Siberia (among others, SBJ 1880, p. 38; RM!), east as far as Lena (PPP 1906b, p. 35), Amur (HEY l.c.), and Kamchatka (BNN, NET, SBR 1929, p. 4).

### Ecology

Exclusive riparian species. In our region found particularly on the banks of larger rivers, on sandy or stony soil that is always covered with a distinct layer of mud. Vegetation, mostly *Carex*, must be fairly rich, but generally has little continuity, and mosses play a subordinate role. The species lives, often gregariously, in very wet places close to water (often together with *Pelophila*). In southern Sweden exclusively (otherwise only now and then) alongside larger or smaller bodies of stagnant water with similar banks; numbers never large in such places. The occurrence of two specimens in a wooded bog ("Bruchmoor") in Finland (RNK 1938, p. 68) is coincidental. The preference for river banks has also been noted in Germany by HOR (1941, p. 318): "found only in the terrain of larger streams ... locally and from time to time rather frequent."

### Biology

Distribution of the few southern Swedish catches: III: 1; IV: 1; V: 7; VI: 14; VII: 4; VIII: 2. I have not seen an immature specimen but the species undoubtedly hibernates as an adult.

<sup>1</sup>The record from Italy (PTA 1923, p. 150; LUI 1929, p. 133) is doubtful (HOR 1941, p. 318).

Wings fully developed. Two cases of spontaneous flight have been observed: Ögl Linköping, May 1918 (SLL, VA!); Nbt Över-Torneå, June 8, 1930 (LTH).

### Fossil Records

Denmark, late glacial (HNR 1933, p. 130). Finland, Ik, postglacial (PPP 1911, p. 38).

*\*Agonum (Idiochroma, Clibanarius) dorsale* Pont.  
(*prasinum* Thunb.)

Distribution  
(map in LTH 1939a, p. 243)

*Sweden:* Highly discontinuous area of distribution. Widely distributed and often frequent in Skå and Ble, as well as on Öld and Gtl. In southern Hll first discovered in 1942 and 1943 near Stjärnarp and Halmstad (FRQ!). In central Sweden distribution continuous, especially in Malar region, although very localized and in general rare; southernmost record—near Ögl Norrköping (FRL! WSJ!), northernmost near Uppsala (several collectors, often in large numbers!), and west as far as Nke Örebro (HTG 1 specimen, 1882, coll. JNS!) and Ekeby (JNS). Only single record between the two main areas of distribution: Små Kalmar region (several collectors!); Virestad, 1933 (LFF!); Fliseryd, 1925 (WLE!). Two records for the west coast are coincidental: Göteborg, Slottsskogen (Malm 1870, several specimens, SDN, manuscript; MG!); Boh Fiskebackskil, August 4, 1931, 1 specimen (Bernell, coll. ARV!).

*Norway:* No records.

*Finland:* Not known for certain whether a resident component of the fauna; it has not been included in the Nordic Catalogus (1939, p. 10). The old record Oa Vasa (WAS, according to SBC 1834, p. 220, and SBJ 1873, p. 123) is certainly erroneous. However, there is a voucher specimen in the coll. HEL (NL!) for the locality of St Yläne (SBJ l.c.). For that reason the locality of Ab Pargas (SBJ l.c.; BFF, MH!) might also be correct, a view also shared by PME (S.H.A. 1939, p. 221; see HLL, N.E. 1934, p. 56) (the label by BFF nevertheless carries a "?"). The species has recently been collected in large numbers right in the center of Helsinki city at Brunnsparcken, August-September 1939 (PME l.c.; PFF, N.E. 1940, p. 23).

*Russian sector:* No records.

53 *Adjacent regions:* In Denmark widely distributed on the islands (including Bornholm), as well as in eastern Jylland; frequent in northern Sjäelland; in western Jylland found only near Esbjerg and Tranum beach (West 1940, p. 46; and in litt.). In Estonia four localities (HAB in litt.); also known in Latvia



(SDL 1872; ULN 1884). Leningrad region (OBT 1876; BSK 1908a, p. xxxix; 1929). British Isles (Joy 1932, p. 366); also frequent in Ireland (JHS and HLB 1902, p. 578).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 202), Corsica (DEV 1935, p. 57), southern Italy, including Sardinia, Sicily (LUI 1929, p. 135), Greece (OTZ 1886, p. 212). Northern Africa (BED 1895–1914, p. 220). Asia Minor (ECH 1922, p. 35; BOD 1927a, p. 57). The Caucasus (CHD 1846, p. 132; SDR and LDR 1878, p. 69). Kirgizia; western Turkestan; western Siberia (HEY 1880–1881, p. 28).

### Ecology

In our region the species is the least hygrophilous of all species of *Agonum* and totally unassociated with bodies of water. Almost xerophilous; found on open lawns and meadows exposed to the sun, often with tall but less dense vegetation (for example, various Umbelliferae). The ground consists of residual soil or gravel, always with a more or less strong mixture of loam; also found on cultivated soil consisting almost entirely of loam. A requirement for limestone is very likely, and has been indicated by foreign authors (WHF 1881, p. 20; Dahl 1928, p. 105; HOR 1941, p. 328). Pure sand is completely avoided, a fact particularly evident in Jylland (West l.c.), which has been emphasized by several authors (ROG 1856, p. 19; Dahl l.c.; GRD 1937, pp. 44, 61); there is only one report to the contrary from the eastern Alps: "on sandy soil" (HEB and MEX 1933, p. 117). It is strange that the species has been characterized as "more or less hygrophilous" by various Central European authors (France: GAL 1886, p. 305; Germany: LTZ 1885–1892, p. 42; BLK 1925, p. 35; to the contrary see, for example, RTT 1908, p. 144). I shall not venture to comment on whether a genuine ecological difference exists. During the day the insect remains mostly among the roots of plants or under larger flat stones, usually in colonies. On Öld and Gtl regularly found together with *Brachynus crepitans* and *Harpalus azureus*. Association with different species of *Brachynus* has already been noted several times (GAV 1897, p. 179; CAI 1908, p. 89; MÜL 1926, p. 249; JEA 1941–1942, p. 895).

### Biology

Swedish catches: III: 8; IV: 11; V: 25; VI: 16; VII: 14; VIII: 15; IX: 17; X: 5; XI: 1. Immature beetles found several times in August and September. The decline in numbers of beetles in midsummer is more pronounced in Denmark; larvae were found there in July and August (LRS 1939, pp. 331, 398). Spring breeder, hibernating as an adult. The report of a larva detected in a molehill (SLK, E.M. 1895, p. 115) was certainly coincidental.

## Dynamics

Wings fully developed, but flight observations absent. Attempts to induce flight upon exposure to sun under glass (on Gtl) were also not successful. The sudden and numerous occurrence in the center of Helsinki city in 1939 might be considered a proof of flight capacity.

\**Agonum* (s. str.) *ericeti* Panz.  
(*bifoveolatum* C.R. Sahlb.)

## Distribution

*Sweden*: In correspondence with its exclusive ecology, the species has a highly discontinuous area of distribution, but is found throughout most of the country. Coastal regions are avoided, especially in the east. In Skå only five localities: St. Olof, June 4, 1942, 1 specimen (E. Sylvén, ML!); Stehag (MLC, HM! Roth, ML!); Herrevadskloster (Roth, E.T. 1897, p. 133); Riseberga, August 1942, 1 specimen (T. Håkansson, ML!); Vittsjö (VNS, SA!). Widespread in Små and Vgl, and from there distribution fairly continuous as far as Hjd and Jtl: Hjd Henådalen (LBL, RM!); Jtl Bodsjö, numerous specimens (BGW!); Undersåker (RNG, E.T. 1915, p. 5; coll. BRD!). Northernmost localities: Tol Jukkasjärvi and Vittangi (ZTT 1828, p. 37; 1840, p. 42), as well as Nbt Pajala (ORS, VA!)—all being directly connected with the Finnish region. The same is probably true for two apparently isolated localities in Vbt: Jörn, July 1936 (LNM!) and Hällnäs, Bodarna, April 23, 1935, May 25, 1936 (HEQ, also in coll. LTH).

*Norway*: Numerous localities in the southeast, then (without distinct connection six localities in the southwest between 21 Sirdal and 7 Opsangervatn in Söndhordland (N.E.T. 1930, p. 338); further, one locality in the central  
55 southern part: 14 Bergset in Öystre Slidre. In Trondheim region two localities: 26 Hitra and 27 Trondheim (N.E.T. 1937, p. 147). In southern Varanger in the extreme northeast, also two localities: 41 Strand and Ryeng (SPS 1894, p. 65).

*Finland*: Distributed almost throughout the country, but rather unevenly represented; localities most numerous in the central southwestern part. In Lapland only four localities: Lk Muonio (SBJ, MH!); Le Pallas-tunturi (RNK 1938, p. 68); Li Väylä (PPP 1905, p. 92); Lp Vaggatem (SPS 1894, p. 65). Apparently missing on the southwestern coast as well as on Åland.

*Russian sector*: Lt Nuortjaur (Itkonen, according to WUO 1916, pp. 21, 22). Kk Uhtua, 1942 (HDL). Several localities in southern Karelia, north as far as Kn Seesjärvi, 1942, numerous (KRH).

*Adjacent regions*: In Denmark only in Jylland, but several localities (West 1940, p. 43). In Estonia two localities (SDL 1872; HAB 1937a, p. 86), also

in Latvia (SDL l.c.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 367).

*Total area:* Palearctic species. In Europe south as far as northern France (DEV 1935, p. 56), northern Spain (FUE 1920, p. 198), northern Italy (LUI 1929, p. 133), Styria (HEB and MEX 1933, p. 116). Southern Poland (ROU 1930, p. 186). East as far as Moscow region (JAC 1905–1908, p. 330). Northeast as far as Mezen (PPP 1908, p. 6). Western Siberia (HEY 1880–1881, p. 28; JAC l.c.).

### Ecology

A stenotopic *Sphagnum* moor species throughout its area of distribution and hence very rightly characterized as a tyrphobiont (Peus 1928, p. 667; KRG 1937, p. 302). Lives both in places covered almost entirely with wet moss (especially *Sphagnum fuscum*), and drier parts with harder peat soil and a strong admixture of *Calluna* and other shoots. Example: Ab Sammatti, Härjässuo, *Sphagnum* heath (moor) in open places with *Sphagnum fuscum* (and patches of *S. angustifolium*, *S. magellanicum*, and *S. apiculatum*); among the higher plants the following are more frequent: *Ledum*, *Calluna*, *Vaccinium uliginosum*, *Oxycoccus*, *Rubus chamaemorus*, and among hummocks *Eriophorum vaginatum*, *Andromeda polifolia*. No open water during summer. The species is frequent here (KRG, LTH). According to KRG (1937; 1939, pp. 1227 ff.) the species requires a sufficiently acidic soil (pH < 4.6) and a strong summery and daily isolation of the marshy soil: “stenothermic-stenoionic (warmth-loving) species” (KRG 1939). This insect is particularly heliophilous, and runs at utmost speed over the mossy surface during sunshine.

### Biology

A distinct spring species. Swedish catches: III: 2; IV: 8; V: 22; VI: 18; VII: 9; VIII: 1; IX: 1. Immature beetles have been recorded in Finland, July 23 and 26 (RNK 1938, p. 68); I saw one specimen from Ögl, September 3, 1938, which had not fully hardened. Copulation observed in Denmark, June 9 (West 1940, p. 44). Spring breeder, hibernating as an adult, which has already been remarked in Denmark (LRS 1939, pp. 329, 393). In Finland, KRG (in litt.) one specimen observed to spontaneously devour an acridid nymph.

### Dynamics

Only brachypterous specimens seen by me (more than 70 specimens examined from Sweden and Finland). Apical part of wing reflexed and wings highly variable in size; unfolded, they reach at most the length of an elytron and are unsuitable for flight. Records from the beach of the German Baltic Sea



(Zebe, S.E.Z. 1852, p. 161; LNZ 1857, p. 13) certainly indicate the possible occurrence of winged individuals that have gone adrift; such must be extremely rare, however. In any case the capability of dispersal of this species is certainly poorer than in any other nordic *Agonum* species, and the insect seems to traditionally belong to the ancient moors. "According to our experience ... *Agonum ericeti* can be considered the leading indicator animal of the glacial and postglacial antiquity of a moor"; Germany (HOR 1941, p. 315).

### Variation

The species is highly variable in color, ranging from pure black to bright bluish, greenish, golden, coppery or even with an iridescent metallic sheen. To some extent the variations are age-dependent and might possibly be affected also by the nature of the soil. The latter viewpoint has been proposed for consideration by KRG. From a purely zoogeographic point of view, these variations are inconsequential.

### Fossil Record

Denmark, postglacial (HNR 1933, p. 130).

57 *\*Agonum (Euophilus) fuliginosum* Panz.

### Distribution

*Sweden*: Distributed throughout the country, except in true fjeld regions. Actual gaps not apparent, but the species is definitely rare on the west coast and on Öld and Gtl. Northernmost localities: Tol Vittangi (ZTT 1828, p. 35; 1840, p. 42), July 29, 1938, frequent (LTH), and Karesuando, 1935, frequent (BRC, RM!).

*Norway*: Distributed almost throughout the country. Gaps possibly present only in the extreme south and to some extent on the southwestern coast. Its absence north of latitude 70° N seems to be actual. Two northernmost localities: 38 Bossekop in Alta (MST), and Lakselv in Porsanger (several collectors). Also in southern Varanger (several localities and collectors).

*Finland*: Likewise distributed throughout the country, but the distribution is somewhat uneven, with occurrence sparser on the Bothnian coastland. Northernmost localities in Lp on the Arctic Sea coast (HLL! LNN, MÅ! LBÅ 1933).

Erroneous: Nl Tvärminne, in sea drift (Frey 1937; STÅ. 1938; = *gracile*!).

*Russian sector*: Numerous localities in the west and south of Kola Peninsula, but not found in the tundra. Several localities in Karelia also.

Erroneous: Sv Sermaks (PPP 1899a, p. 17; FA = *gracile*!).



*Adjacent regions:* In Denmark, including Bornholm, widely distributed and frequent (West 1940, p. 46). Estonia (SDL 1872; HAB in litt.); Latvia (SDL l.c.; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 579).

*Total area:* Palearctic species. In Europe, south as far as central France (DEV 1935, p. 57), northern Italy (LUI 1929, p. 136), Bosnia (APF 1904, p. 296). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 310). The Caucasus (according to CKI 1927–1933, p. 869). Western Siberia (among others, SBJ 1880, p. 39; RM! MKL 1881, p. 20; PPP 1907d, p. 24).

### Ecology

The most eurytopic species of *Europhilus* with no dependence whatsoever on bodies of water. It is less dependent on humidity, but likes shade more than any  
58 other species and definitely requires a layer of mull on the soil. It is especially frequent in *Alnus* moors (preferably with *Sphagnum*), in *Salix* shrubs, in humid deciduous and mixed forests, in dark brook ravines, etc. In southern Sweden the species is often found together with *A. obscurum*, *Pterostichus strenuus*, *Trechus secalis*, and several others. Regularly found on all kinds of more or less shaded banks of fresh water, provided the soil is hard, and often together with *A. thoreyi* and *piceus*, less often with *gracilis*, especially since this species lives mostly at very wet and exposed localities. In Finland, very numerous in wooded bogs (“Bruchmoore”) of every kind (RNK 1938, p. 68). The eurytopic character of the species is evident in Central Europe also (among others, HOR 1941, p. 325). It is definitely an inhabitant of forests which normally do not reach the *reg. bet.* Yet one specimen was found in the *reg. alp.*, from Hjd Helags, July 26, 1936 (BRK!), and the species has also been reported from Dudinka in the Siberian tundra region (SBJ 1880, p. 39); at least the *reg. alp.* record must be coincidental.

### Biology

Southern Swedish catches: II: 4; III: 8; IV: 31; V: 62; VI: 81; VII: 34; VIII: 14; IX: 17; X: 19; XI: 9. Maximum abundance in Denmark earlier, in May (LRS 1939, p. 330). The duration of emergence of adults is very long and hardening of the cuticle slow; immature beetles are thus observed from August 15 (Sdm) to November 24 (Vgl). In Denmark larvae seen in July and September (LRS l.c.). Normally a spring breeder, hibernating as an adult. Exceptionally, earlier populations may also hibernate; I found stray immature beetles on April 16, 1942 and May 3, 1925 (Upl) and have seen them many times in Nbt in May, and even one on June 12, 1938.

## Dynamics

Up to now, this species has generally been considered brachypterous. Wing rudiments somewhat variable, but never reach the length of an elytron. Among the more than 150 specimens examined by me from Sweden and Finland, I found, however, one specimen (Ta Pirkkala, SAR) with fully developed and certainly functional membranous wings. This form is so rare, at least within the region, that no biological significance for dispersal can be ascribed to it. Nevertheless, as a eurytopic bog species, *fuliginosum* has a notable capability of dispersal in our region. The numerous finds in sea drift reported for southwestern Finland (PME 1944, p. 39) probably refers to *gracile*, with which this species has been confused.

59

## Variation

Quite variable in size. Some individuals brownish-red throughout their life, especially the elytra. I could establish no geographic correlation for this character.

## Fossil Records

Denmark, late and postglacial (HNR 1933, p. 133). Finland, NI, postglacial, uncertain identification (PPP 1911, p. 38).

*\*Agonum (Europhilus) gracile* Gyll.

## Distribution

*Sweden*: Distribution almost uniform throughout the country, except for the greater part of Lapland; the gap in Ång is certainly only fictitious. On Öld the species is rare, and on Gtl discovered coincidentally only in recent years (since 1938). In the true fjeld region this species may occur accidentally at most; from Lapland only six localities known, of which the two northernmost ones are: Lyl Tärna, July 8, 1937, 1 specimen (Holm, coll. LTH); Lul Pålkem, June 1941, June 1942 (WRN!).

*Norway*: The species had earlier been considered a rarity, but as soon as its bionomics became correctly known, it was discovered in several new localities. Widely distributed in the forest and coastal regions of the south, especially in the southeast. Two localities near Bergen (N.E.T. 1930, p. 339), and two in the inland: 13 Ringeby; 11 Björsjökletten in Tynset. In the high north five localities: 32 Rognan in Saltdal (MST); 34 Skagen in Bö (MST); 36 Rundhaug and Solvang in Målselv (SPS 1888–1889, p. 115; N.E.T. 1932, p. 27); 35 Tromsø (SPS l.c.).

*Finland:* Distribution nearly universal but in part somewhat sparse. Its absence on the southern Bothnian coastland apparently fictitious. Northernmost localities: Lk Muonio (SBJ, MH!); Li "Lac Inari" (PPP, FA, as *consimile!*); Lp Nautsi (LNN, MA!).

*Russian sector:* Kola Peninsula, two localities on the southern coast: Lm Umba (EDG, MH!); Tschapoma (PPP 1905, p. 93; MH!); and one locality in the west: Lt Lutto (PPP l.c.; MH!). In southern Karelia, several localities (several collectors!).

*Adjacent regions:* In Denmark, including Bornholm, widely distributed but not frequent (West 1940, p. 46). Estonia (DPF 1924; HAB in litt.); Latvia 60 (SDL 1872, LBÅ 1932). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 579).

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 57), northern Italy (LUI 1929, p. 136), Transylvania (PTI 1912, p. 39). In the northeast as far as Pechora (SBJ 1898, p. 339). Siberia (HEY 1880–1881, p. 30; SBJ 1880, p. 39; RM!), east as far as Amur (HEY 1893, p. 17).

### Ecology

Lives in very wet places with luxuriant vegetation, immediately next to bodies of water, and always in open places which are exposed to the sun, chiefly beside stagnant, often quite small, bodies of water. In very high number on dripping wet, swaying *Sphagnum* carpet with sparse *Carex*, *Menyanthes*, and similar plants, where it is (besides *munsteri*, and occasionally *ericeti*) the only *Agonum* species. Additionally, often found on harder, moss-enriched banks with *Carex*, even together with *A. thoreyi* and *piceum*, which are not found at the markedly dystrophic forest lakes and at *Sphagnum* moors. In northern Finland abundant in hypnum moss bogs ("Braunmoore") (PFF 1943, p. 98). Its predilection for *Sphagnum* is also evident in Finnish wooded bogs ("Bruchmoore") (RNK 1938, p. 69) and seems to be even more pronounced in Central Europe than in our region (Peus 1928, pp. 577, 669; ROU 1934, p. 74; HOR 1941, p. 325; JEA 1941–1942, p. 893). Its occurrence on seashores (GRD 1937, p. 44; West 1940, p. 46; sporadically also in our region) is certainly only coincidental. Farther up, actual fjeld regions are not regularly reached; only one specimen—Hjd Tanndalen, 1938 (BRK!)—recorded in the *reg. alp.*

### Biology

Southern Swedish catches: I: 2; II: 4; III: 2; IV: 12; V: 47; VI: 62; VII: 20; VIII: 12; IX: 12; X: 5; XI: 5; XII: 1. Maximum abundance in Denmark, like in *fuliginosum*, one month earlier (LRS 1939, p. 330). Immature specimens

observed in numerous cases between July 13 (Små) and August 18 (Upl). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. In May and June 1941 (Upl) I was successful in inducing two beetles to fly upon exposure to sun under glass, as well as under a strong lamp at night. The record of eight specimens in sea drift in Finland (Frey 1937, p. 437, "*fuliginosum*"!) indicates spontaneous flight.

61

### Fossil Records

Denmark, postglacial (HNR 1933, p. 132). Finland NI, Ik, St, Oa, postglacial, several doubtful records (PPP 1911, p. 38). France, "lignites quaternaires" (FLC 1875, p. 1234).

\**Agonum* (s. str.) *gracilipes* Dft.  
(*elongatum* Fisch.)

Distribution  
(map in DEV 1930, p. 105)

*Sweden*: So highly dispersed and sporadic in occurrence that one cannot say for certain whether this species is native to this country. Only on the southern coast of Skå has it been recorded several times but these beetles may have flown in from another country. Other records: "North Skåne" (THS 1859, p. 261). Öld Persnäs, Lofta, May 20, 1928 (LOH, coll. JNS!). Gtl Sandön (JNS 1925, p. 68!), "frequent" (EIS and STX 1868, p. 375); Fårön, Sudersand (JNS!), July 26, 1926 (OLS!). Vgl Mölndal (ERC, 1 specimen, MG!). Hls Hudiksvall (leg. ? 1 specimen, RM!).

Doubtful: Ble (MLG 1863, p. 33). Små (BOH, according to THS, 1859, p. 261; no voucher specimen).

*Norway*: Only two localities: 16 Strand in Tinnsjö (ESM); 24 Sörem in Vågå, numerous, also immature beetles, September 1896, September 1897 (MST, N.E.T. 1922, p. 119; among others, in MW!).

*Finland*: Only 3 specimens in the Skärgård, NI Tvärminne, in sea drift, July 30, 1936, 1 specimen (STÅ 1938, p. 19!), 1939, 2 specimens (PME, S.H.A. 1940, p. 81!).

Erroneous: Ab Pargas (HLL 1936, p. 227; MH = *mülleri*!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark several localities, of which four are on Bornholm, but only two in Jylland; the species seems to have become scarcer in recent years (West 1940, p. 44). In Estonia only one certain locality: Tähtvere, April 22, 1935, 2 specimens (HAB); in Latvia, on the contrary, several local-



ities, all on the coast (LCK and MIK 1939); also in northern Poland (OGI 1931, p. 33). Unknown in the Leningrad region. British Isles, only in England (Joy 1932, p. 367).

*Total area:* Palearctic species. In Europe south as far as Holland (EVS 1898, p. 71; 1922, p. 26), Elsass (DEV 1935, p. 56), northern Italy (LUI 1929, p. 133), Croatia (APF 1904, p. 290), Transylvania (PTI 1912, p. 38). Kirgizia (HEY 1880–1881, p. 29). Western Siberia (among others, SBJ 1880, p. 38; RM! PPP 1907d, p. 23). Tibet (according to CKI 1927–1933, p. 827).

### Ecology

The occurrence of this species within the region is very peculiar. There is no locality in which it continuously or permanently occurs, and I consider it a transient and not a resident species. In Sweden and Finland only records from the coast exist, but it has not been proven that the species is an exclusive shore inhabitant in other regions. Both records from Norway, however, are from the inland, and the insect evidently remained near Vågå for at least two years (1896 and 1897), where it was found in large numbers and even observed breeding. However, it has never been collected since. In Skå the species has not been observed in the twentieth century, even though it was earlier recorded in great numbers near Sandhammaren by THS (1867a, p. 49), in the same decade that EIS and STX (1868, p. 375) found it “frequent” on Sandön. At that time it suddenly became frequent in Denmark (SDT 1861, p. 164), where it is rare again today (West 1940, p. 44). For Central Europe, aside from more or less coincidental finds on the sea coast, little ecological information is available. The species lives “in sandy, dry places” according to LTZ (1885–1892, p. 40), but according to Dahl (1928, p. 99), “in more humid places, especially on the banks of ponds and rivers, under moss and leaves”. In the eastern Alps the species has been repeatedly collected “by sifting the lichen *Peltigera canina*”. It is possible that the species is unusually vagile not only on the seashore but also inland, and appears everywhere as a “migrant”; the data from Silesia (RTB, B.E.Z. 1867, p. 412) seems to bear this out.

### Biology

The few dated catches from Sweden were made between May and August. In Denmark above all in June and August (LRS 1939, p. 329). Since several immature beetles were found in Norway in September, it can be assumed with certainty that the species breeds during spring and hibernates as an adult.

### Dynamics

Wings fully developed. Unusual predilection for nocturnal flight. Numerous

observations reported from Central Europe (see, for example, HOR 1941, p. 317). In Finland recorded only in sea drift (3 specimens).

63

*Agonum* (s. str.) *impressum* Panz.

Distribution

*Russian sector*: Recorded exclusively in southernmost Karelia at two localities on the shore of Lake Ladoga in 1942: Ko Vitele, July 22, 1 specimen (KNG!); immediately north of Swir estuary, numerous (PME, S.H.A. 1943, p. 31! PFF!).

Erroneous: Kn Semsjärvi (N.E. 1943, p. 164). One specimen of *Pterostichus oblongopunctatus* (!) labeled as this species in the CRP collection.

Neither found in the rest of Fennoscandia nor in Denmark.

*Adjacent regions*: Estonia (HAB in litt.); Latvia (SDL 1872). Leningrad region (BSK 1908a, p. xxxviii). Also in northern Poland (OGI 1931, p. 32). Not recorded from the British Isles.

*Total area*: Palearctic species (doubtful in North America; Leng 1920, p. 64). In Europe, predominantly in the east, west as far as Holland (EVS 1898, p. 71) and northeastern France (DEV 1935, p. 56); south as far as northern Italy (LUI 1929, p. 132) and Transylvania (PTI 1912, p. 38). In northern Germany less constant (HOR 1941, p. 313). Kirgizia (HEY 1880–1881, p. 28). Siberia (among others, SBJ 1880, p. 38; RM!), east as far as Lena (PPP 1906b, p. 35), Amur (HEY 1893, p. 16), and Kamchatka (BNN, NET, SBR 1929, p. 4). Tibet (according to CKI 1927–1933, p. 828). Japan (RTT 1907, p. 64).

Ecology

A biotope in Ladoga has been quite vividly described by PME (S.H.A. 1943, p. 31): The shore is very flat (“flooded meadow”) and consists of fine sand partly intermixed with humus, with a more or less continuous vegetation of *Scirpus*, *Agrostis*, and *Juncus*. The carabids prefer to remain at the drift border at the former high-water mark. In Central Europe principally found on the banks of rivers, but also on lake shores on sandy or gravelly soil (KTT 1873–1874, p. 53; Dahl 1928, p. 100; HOR 1941, p. 313).

Biology

PME (l.c.) found several immature beetles in August and September. Accordingly one may assume with some certitude that the species breeds in spring and hibernates as an adult.

Wings fully developed. Insect undoubtedly with flight capacity but no corroborative observations.

*\*Agonum (Platynus, Limodromus) krynicki* Sperk.  
(*uliginosum* Er.)

#### Distribution

*Sweden:* Only seven localities: Skå Lindved (THS, 2 specimens, ML!); Stehag (MLC and Roth; represented in great numbers in various museums and collections!). Små Kalmar (AHT, VA! HGL, coll. JNS! WLN, LG!). Öld region of Stora Rör and Halltorp (represented in most of the larger collections by many collectors and specimens!). Gtl Hellvi, in a dark *Salix-Filipendula* swamp near Fardume, September 24, 1927, 1 specimen (LOH, coll. JNS!); Källunge, moist deciduous forest meadow, May 23, 1940, 1 specimen (LTH).

Not recorded for the rest of Fennoscandia.

*Adjacent regions:* In Denmark only solitary localities on the islands, excluding Bornholm (West 1940, p. 45); also near Bognæs in the vicinity of Roskilde (KNG). In Estonia (also according to JAC 1905–1908, p. 329) and Latvia, one locality each respectively: Kastre-Peravald, May 21, 1933, 2 specimens (HAB), and Leegen, September 7, 1908 (LCK). Leningrad region (BSK 1908a, p. xxxviii; 1909, p. 154; 1929, p. 146). No records from the British Isles.

*Total area:* Palearctic species. Predominantly in the east, west as far as Elbe (HOR 1941, p. 326). South as far as Corsica (DEV 1925, p. 56), central Italy (LUI 1929, p. 135), and Bosnia (APF 1904, p. 289). In Russia, east as far as Ural (JAC 1905–1908, p. 329). Kirgizia (HEY 1880–1881 = p. 27). Siberia: Baikal region (HEY l.c.; JAC l.c.). JEA 1941–1942 (p. 881) wrote: “Cette distribution discontinue est assez étrange”; but the complete distribution was not known to him due to non-acquaintance with the literature.

#### Ecology

In dark, swampy, deciduous forests with strong mull formation and rich ground vegetation, for example *Filipendula ulmaria*. The scant data available indicates loamy soil. Perhaps the species also requires limestone. The species lives under leaves and moss, as well as under rotting bark, sometimes together with *assimile*.

Distribution of the few dated Swedish catches: V: 5; VI: 3; VII: 1; VIII: 0; IX: 3. In Denmark and Germany the decline during midsummer is still more evident;

immature beetles were observed in August (LRS 1939, p. 331). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Insect undoubtedly with flight capacity but no corroborative observations.

*\*Agonum (s. str.) livens* Gyll.

### Distribution

(map in DEV 1930, p. 101)

*Sweden*: Definitely an eastern species. Only two localities on the west coast: Skå Hallands Väderö, 1937, 2 specimens (A. Ringdahl, O.E. 1939, p. 176); Hll Fjärås, 1 specimen (ERC, MG!). Otherwise found continuously from Skå as far as to the river Dalälven, albeit sparsely distributed. Westernmost localities (north of latitude 58° N): Vgl Kinnekulle (GYL 1810, p. 149); Hornborgasjön, April 1939, 1 specimen (WRN). Northernmost localities: Upl Forsmark, June 26, 1936, 7 specimens (LTH); Älvkarleö, Båtfors, June 1937, 1 specimen (Palm!); Gst Gysinge, April 22, 1935, 1 specimen (Palm). Isolated in the north: Hls Iggesund (WNG, E.T. 1880, p. 192; 1 specimen, KF!).

*Norway*: No records.

*Finland*: Partly in the southwest, north as far as Ta Ylöjärvi (GBL), east to the Helsinki region (several collectors!); partly southeast, with several localities in the Isthmus of Karelia and on Lake Ladoga. Additionally, isolated near Kb Juuka, Juuanvaara, July 3, 1940, 2 specimens (KRG!), as well as on the islands of Hogland and Seiskari in the Gulf of Finland (HLL!). The distribution gap on the southern coast may be real. On Åland only near Jomala, Hammarudda (STK).

*Russian sector*: Only one locality just north of Swir estuary, 1942 (KRH!).

*Adjacent regions*: Fairly well distributed in the southern parts of Denmark (as well as in southeastern Jylland and on Bornholm) but not frequent (West 66 1940, p. 45). Estonia (HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876, BSK 1929, p. 146). British Isles, only England (Joy 1932, p. 366).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1920; p. 200), central Italy (LUI 1929, p. 134), Serbia (APF 1904, p. 289), Transylvania (PTI 1912, p. 38). Western Siberia (HEY 1880–1881, p. 28; SBJ 1880, p. 40; RM! PPP 1907d, p. 23).

### Ecology

In shaded swamps in deciduous-forest or mixed-forest of various types. Partly in wooded bogs ("Bruchmoore") with *Sphagnum* on localities characteristic



for *Trechus rivularis*, and sometimes found together with the latter.<sup>2</sup> Partly on completely *Sphagnum*-covered, or altogether moss-free surfaces at the edge of shaded ponds or forest swamps richly covered with leaves, even on highly loamy soil. Swamps with *Betula* and *Alnus glutinosa* seem preferred. Example: Ab Karislojo, Karkkali, small shaded pond filled with water only in spring, in thick birch forest. Soil rich in humus with considerable layer of birch leaves. Vegetation less dense (arranged in order of frequency: *Carex vesicaria*, *Sparanium simplex*, *Ranunculus flammula*, *Scutellaria galericulata*, *Comarum*, and *Polygonum hydropiper*. August 1938 (KRG, LTH). On the banks of larger bodies of water only solitary or more or less coincidental, for example, after high water. In Germany also found in beech forests (LLL, S.E.Z. 1915, p. 214). The species hides during the day under moss and leaves.

### Biology

Swedish catches: IV: 5; V: 20; VI: 15; VII: 11; VIII: 3; IX: 2. In Denmark distinct increase in numbers observed in September, when immature beetles are also found (LRS 1939, p. 330). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight observed in Austria (MÜL, W.E.Z. 1904, p. 177). In Finland, 2 specimens in sea drift (PME 1944, p. 39).

67

\**Agonum* (*Platynus*, *Limodromus*) *longiventre* Mannh.

### Distribution

*Sweden*: Exclusively within a small region on the lower run of the Dal River, and north of it. Localities: Upl Älvkarleby, 1937 and 1938, altogether about 20 specimens from islands in the Dal River, partly north of the provincial boundary in Gst Hedesunda (Palm!). Gst Gysinge, bank of the Dal River, September 1940, 1 specimen (Palm); Storvik, June 1856, 1 specimen, (AND, E.T. 1896, p. 66; LF). Dlr By, Vidön Island in Dal River, 1940 (Palm! LTH); Hedemora, Brunna, 2 specimens (RGS, E.T. 1913, p. 232; MG! coll. LTH).

Neither recorded from the rest of Fennoscandia nor from Denmark.

*Adjacent regions*: Estonia, Narva (SDL 1891; according to HAB in litt., later found there by SUM); absent in Latvia. Leningrad region (OBT 1876; BSK 1922, p. 55).

*Total area*: Palearctic species. In Europe markedly eastern, at no point reaching the west coast, and distributed west as far as the mid-Rhine (HOR 1941, p. 327); south as far as northern Italy (LUI 1929, p. 135) and Hungary

<sup>2</sup>Strangely, *Agonum livens* is missing in RNK's wooded bog material (1938) from Finland.

(KTY 1900, p. 31). In central Russia, north as far as Gorki (JAC 1905–1908, p. 329). The Caucasus (JAC l.c.). Western Siberia, widely distributed (among others, SBJ 1880, p. 38; RM! PPP 1907d, p. 23).

### Ecology

Lives within the restricted Swedish area, especially in old, virgin deciduous forest, which is flooded from time to time, on the Dal River (described by Palm, E.T. 1942, pp. 3 ff.). Soil moist, shaded, and rich in vegetation (*Filipendula ulmaria* and others). The species has a predilection for living under the bark of dead *Populus tremula* (standing as well as fallen), at times together with *assimile*; some specimens were collected with an insect net from ground vegetation; two beetles had climbed to the crown of an oak tree infested with tortricids (Palm). Also found in Central Europe, often in lowland forests of rivers or on their banks during floods (FRM, W.E.Z. 1899, p. 48; RTT 1908, p. 144; FCK, E.B. 1929, p. 49; GRD 1937, p. 44). A preference for *Populus* has not been indicated here; found, among others, in pine and beech forests (Zebe 1852, p. 161; GRD l.c.). Consistently found on oak, in abandoned squirrel nests (SKY, D.E.Z. 1891, p. 153).

### Biology

The few Swedish catches were made between May and September. Palm found five immature beetles on July 17, 1937. Information from Germany (Zebe l.c.) also indicates that the species hibernates as an adult.

### Dynamics

Wings fully developed. Spontaneous flight observed in Silesia (LTZ 1852, p. 159).

*\*Agonum* (s. str.) *lugens* Dft.

### Distribution

*Sweden*: A very striking distribution. Two localities in Skå: Herrevadskloster (Roth, according to THS 1867a, p. 49; in MG, 1 specimen labeled "Skåne, THOMSON"!); Vombsjön (MLG 1863, p. 33). Öld (many specimens from several collectors, mostly without precise labeling). Stora-Rör, May 28, 1938, 1 specimen (KMK!); Borgholm, April 1871, 1 specimen (coll. TIM, LU!); Grankullavik, June 6, 1943, 1 specimen (BCK!). Gtl, five localities discovered earlier by BOH (1849, p. 201; 1850, p. 71). Furthermore, in a separate area in central Sweden, where the species, especially on lake Mälaren, is widely distributed and locally frequent. South as far as Sdm Vrena, August 15, 1937,

numerous (LTH); west as far as Sdm Mälarbaden, June 20, 1936, 1 specimen (LTH) and Vst Västerås (several collectors!); north as far as Upl Bennebol, 1 specimen (RGS!).

Erroneous: Lyl Sorsele (E.T. 1928, p. 86 = *dolens*!).

Norway: No records.

Finland: Al Föglö, Sommarö, July 5, 1942, one male near the sea (N.E. 1943, p. 50; coll. LBG!); Finström, Bjär-ströms-träsk, June 22, 1943, one female (LBÅ).

Russian sector: No records.

Adjacent regions: In Denmark rare, but found at several localities on the islands (excluding Bornholm) and one locality in Jylland (West 1940, p. 44). Supposedly in Estonia near Arensburg on Ösel (SZL 1937, p. 248); I tried to receive a voucher specimen for examination without avail, but the record is very probable. Not known in Leningrad region as far as I know. No record from the British Isles.

69 Total area: Euro-Mediterranean-Caucasian species. In Europe predominantly eastern, not found in Holland and Belgium south as far as Portugal (FUE 1920, p. 199), Corsica (DEV 1935, p. 57), central Italy, Sicily, Sardinia (LUI 1929, p. 134), and Albania (APF 1904, p. 290). In Russia, east as far as Ural, north as far as Yuroslav (JAC 1905-1908, p. 331). Northern Africa (BED 1895-1914, p. 219). The Caucasus (SDR and LDR 1878, p. 69; LSH 1936, p. 142).

### Ecology

In swampy regions on the banks of mostly larger eutrophic (loamy) lakes. Prefers wet, very soft soil, often pure foul-smelling gyttja.† In thick vegetation of *Phragmites*, *Scirpus silvaticus*, *Glyceria spectabilis*, and similar plants. The species tolerates the weak shade of bushes or deciduous trees. Hibernates in tree stumps under moss, etc. close to the bank (Upl, found many times).

### Biology

Swedish catches: IV: 2; V: 11; VI: 12; VII: 5; VIII: 2; IX: 2; X: 1. In Denmark (according to LRS 1939, p. 330) found only until June (according to West 1940, p. 45, also in August). Immature beetles collected on August 15, 1937 (Sdm), but 1 specimen also on May 15, 1937 (Sdm); but normally hibernation is as an adult.

† (= mud of organic material (limnological deposits) which formed during deficiency of oxygen; suppl. scient. edit.).

## Dynamics

Wings fully developed. One specimen (Sdm) was induced to flight on June 9, 1941 upon exposure to the sun under glass. Spontaneous flight to light has been observed in Austria (HEB and MEX 1933, p. 116). Findings on the seashore (GRD 1937, p. 37; West 1940, p. 44) certainly represent drift specimens.

## Fossil Records

Denmark, interglacial (HNR 1933, p. 131). France, postglacial (LSN 1925, p. 948).

*\*Agonum* (s. str.) *mannerheimi* Dej.

## Distribution

*Sweden*: A rarity of the first order. The only definite locality in Nbt Pajala, 1908, 1 specimen (ORS, coll. LTH). A second specimen, "Lapp. interm." (WBG, RM!), is also certainly from Sweden. A third specimen (coll. THS, MB!), labeled "Lapl.," could perhaps refer to Finnish Lapland.

70 *Norway*: Only 1 specimen: 12 Vardal (HSS, HLS 1900, p. 32).

*Finland*: Rare, but certainly distributed continuously throughout the inland of the country as far as the Swedish and Norwegian borders. Westernmost locality: St. Yläne (SBJ 1873, p. 117; MH!); northernmost localities: Lk Muonio, 1867, 1 specimen (SBJ 1871b, p. 404; 1873, p. 117; SAA 1917, p. 288); Lp Pitkäjärvi (FRT, coll. WLL!). The southernmost record is one specimen from Tytärsaari (sea drift) in the Gulf of Finland (HLL, MH!).

*Russian sector*: An old record, locality not given, from southern Karelia (PPP 1899a, p. 15). In 1944 found near Sv Uslanka (PFF).

*Adjacent regions*: Not known from Denmark, nor from Central Europe. Yet one specimen was recently, July 3, 1925, found near Narva in Estonia by SUM (according to HAB in litt.). According to LMN (1913, p. 59) detected in Lithuania. Leningrad region (MAS 1903, pp. xii, cxxxiii; BSK 1922, p. 55).

*Total area*: Palearctic species. In Europe, outside the region, only in Russia, south as far as Gorki (JAC 1905–1908, p. 329). Western Siberia (HEY 1880–1881, p. 28).

## Ecology

Ecological observations are available only from Finland. According to SAA (1917, p. 286): ". . . a very typical inhabitant of humid spruce forests. It thrives best in very thick, dark bog forests, although also found in somewhat more open wooded bogs ("Bruchmoore"), and even in heath moors ("Reis-



ermoores") . . ." Yet there is only one specimen in the wooded bog material of RNK (1938, p. 68). Common often under the bark of dead trees, especially spruce, which the species often climbs to quite some height.

### Biology

The Finnish catches (SAA l.c.) are rather uniform throughout the summer: V: 4; VI: 7; VII: 7; VIII: 5; IX: 6; X: 1. Immature beetles have been recorded at the end of August. Doubtful record of a larva on July 9. The species undoubtedly breeds in spring, hibernating as an adult.

### Dynamics

Wings fully developed, but flight observations not available. However, the record of a single specimen in sea drift on the little island of Tyttärsaari in the Gulf of Finland does indicate flight capacity.

71

### \**Agonum* (s. str. ) *marginatum* L.

#### Distribution

*Sweden*: On the west coast and the adjacent inland from Ble to Boh apparently continuously distributed; also occurs more frequently on Öld and Gtl. Next found in Små Kalmar, 1866 (STH, ML!). Thereafter two localities on Lake Vätter: Vgl Hjo, June 6, 1936, 1 specimen (LTH); Ögl Tåkern, May 27, June 11, 1928, numerous (Palm!). In the Mällar region more abundant, south as far as Sdm Vrena (LTH), north as far as Uppsala (several collectors!), but west as far as Vst Västerås, only 1 specimen (SDN, MG!). Finally recorded in Vrm, near Visnums-Kil 1936 (several specimens in the stomach of a crow; NOT!) and Arvika, June 30, 1933, 1 specimen (LTH).

*Norway*: Several localities from the Swedish boundary to the Oslo region, north as far as 2 Ringerike in the inland. Totally isolated record near 6 Jäeren, Kvalbein, 1910, 2 specimens; 1911, 1 specimen (HLS 1915, p. 24).

*Finland*: An extreme southern species. Five localities in the extreme southwest. Ab Dragsfjärd (RAJ, several specimens, MÅ!); NI Hangö (SBJ, MH!); Tvärminne (LBG!); Storharun (KAN, coll. STK); Ekenäs (PRT).—In the Isthmus of Karelia several localities north as far as KI Kexholm (N.E. 1921, p. 114), and west as far as Ka Koivisto (KNG). Furthermore, on all five islands in the Gulf of Finland (SRS, MH! HLL! THG! KRG); newly emerged beetles also found in Seiskari.

Doubtful: Åland (according to SBJ 1873, p. 117; 2 old specimens, MH!).

*Russian sector*: Only found on Ladoga beach north of the mouth of Swir River: Sv Gumbaritsa, 1942, 4 specimens (PME!).

*Adjacent regions:* In Denmark widely distributed, including Bornholm, and rather frequent (West 1940, p. 44). In Estonia also widely distributed, especially along the coastal regions (HAB in litt.). Latvia (SDL 1872; ULN 1884); Lithuania (HEY 1903). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 366); also frequent in Ireland (JHS and HLB 1902, p. 578).

*Total area:* Western Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 199), Corsica (DEV 1935, p. 56), southern Italy including Sardinia and Sicily (LUI 1929, p. 133), Greece and Crete (OTZ 1886, p. 212). Northern Africa (BED 1895–1914, p. 219). Canary Islands, Madeira, Azores (JEA 1941–1942, p. 885). The Near East (“Vorderasien”) (BED l.c.; ECH 1922, p. 35; Puel 1938, p. 182). The Caucasus (CHD 1846, p. 132; SDR and LDR 1878, p. 69). Western Turkestan (HEY 1896, p. 11). The record from “Siberia” (CKI 1927–1933, p. 830), could not be confirmed.

72

## Ecology

On the banks of stagnant or slow-flowing waters or at the seaside. Always on flat and level loamy or loamy-sandy soil (often on very wet slime) exposed to the sun, and with more or less dense, though generally short grasses or *Carex*. At the sea mainly occurring in marshy meadows, but in northern Germany on beaches with Juncaceae (GRD 1937, p. 65). In Central Europe the species seems more riverine than in our region (for example, GRD l.c.; HOR 1941, p. 318). This could be related to its marked affinity for warmth; one can readily observe that it seeks out flat beaches in Sweden, where the water is greatly warmed in summer.

## Biology

Swedish catches: I: 1; II: 0; III: 3; IV: 2; V: 5; VI: 25; VII: 15; VIII: 9; IX: 9; X: 2. Appears much earlier in Denmark, maximum abundance in the first half of May (LRS 1939, p. 329). Immature beetles from August 8 (Gtl) to September 8 (Skå), in Denmark from end of June to end of September, and larvae from July to beginning of September (LRS l.c.). Copulation observed on July 24 (Små). Hibernates as an adult.

## Dynamics

Wings fully developed. As far as I know, flying beetles have not been observed within the region; however WGN (in litt.) has observed flight near Berlin.

\**Agonum (Europhilus) micans* Nic.  
(nec Grill 1896; *scitulum* Thoms. nec Dej.;  
*pelidnum* Dft. nec Thoms.)

Distribution

*Sweden*: Area highly split. Majority of reports quite recent. Skå Silvåkra, 1937, 1 specimen (EHB, ML!); near Ringsjön, several records (several collectors!) at least since 1880 (Roth, ML! MLC, HM! THS 1884, p. 1030); Ljungbyhed, 1900, Riseberga, 1901 (ROS, ML!); Ängelholm, 1937 (LBÅ, coll. LBG). Ble Mörrum, 1936 (JNS), 1941 (BRD!). Små Virestad, 1928 (BRC!); Fliseryd and Mönsterås, 1932 (LOH, MG!). Vgl (1 specimen, without locality, probably before 1900, LPA, VA!), Mariestad, 1936 (LTH). Boh Långvallsfors, 1933 (LTH). Ögl Odensfors near Svartån, 1941 (LOH, MG!). Sdm Sätersta, 73 1907 (OTT!). Numerous records in the Mälar region, also Upl and Vst; earliest for Sdm Toresund (SLL and SDN, VA!) and Vst Västerås (SLL, VA!), but none before 1900. Vrm, four localities on the Klarälv River, 1933 (Palm and LTH 1937, p. 118!). Dlr Smedjebacken, 1942 (OTT!). Several localities on the Dalälv River, also in Upl and Gst, the earliest (after 1900) near Hedemora (SDN, MG! JNS!). Gst Ovansjö, 1941 (A. Wirström!). Hls Ljusne, 1936 (LTH); Färila, 1943 (LBL, RM!); Los, first in 1943, earlier searched for in vain (SJB). Ång Mellån, 1939 (BRC, RM!) Jtl Ragunda, after 1910 (FRI, VA!, SLL, RM!); Bispgården, 1930, 1932 (LTH and Palm 1934, p. 38!). Nbt Älvsbyn; Vitsaniemi; Over-Torneå; 1930 (LTH and Palm l.c.); Edeforsen and Harads, 1938 (LTH). Pil Skatträsk, 1931 (PRS, ML!).

The species is not represented in older Swedish collections. The earliest known records thus originate from the year 1880 (Skå).

*Norway*: In the southeast widely distributed on larger rivers, south as far as 3 Larvik, 1912 (NTV, MO!); three westernmost localities in Telemark (HLS 1915, p. 17). Farther north, three localities in the central south: 14 Fagernes; 13 Ringebru and Sel, 1929 (STA). Thus there is evidently a connection with the area in Trondheim region: 27 Trondheim; Melhus (N.E.T. 1937, p. 147); 28 Stjördal (l.c.). First recorded in 1878 near 10 Kongsvinger (HLS 1891a, p. 17).

*Finland*: In older collections only 1 specimen (coll. MNH, MH!) labeled "Viborg," which earlier was wrongly considered doubtful (N.E. 1935, p. 89; for example, not mentioned by SBJ 1873). In recent years the following records: I. Coastal region of the south. Ab Karislojo, Sonnilampi, 1942, repeatedly and several specimens (KRG); NI Helsinge, since 1915 (several collectors! N.E. 1934, p. 118); Helsinki, Tölövik, March 28, 1920 (STN!). II. Southeast. KI Kexholm, June 21, 1932 (KNG); Ik Uusikirkko (PRT); Metsäpirtti, 1934 (KRG, N.E. 1934, p. 128!). III. North. Om Revonlahti, on Siikajoki, June 2, 1934, 1 specimen (PME!); Ks Kuusamo, Oulankajoki, June 10, 1939, 2 specimens (PFF 1943, p. 122!).

*Russian sector:* Only one old record, without locality, from southern Karelia (M.F.F. 13, 1886, p. 266; PPP 1899a, p. 17; MH!).

*Adjacent regions:* In Denmark rare and scattered, but found in Jylland as well as on the islands (excluding Bornholm) (West 1940, p. 46). In Estonia species unknown (HAB in litt.), but discovered in Latvia in 1931 (LBA 1932, p. 164). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 579).

74 *Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 57), northern Italy (LUI 1929, p. 135), Greece (OTZ 1886, p. 212). Northeast as far as Pechora (PPP 1907c, p. 310). Western Siberia (HEY 1880–1881, p. 29; 1893, p. 17; SBJ 1880, p. 39; RM!). Northern Mongolia (PPP 1907d, p. 24).

### Ecology

Stenotopic shore species, inhabiting banks of stagnant and running fresh waters. Always on loamy-slimy soil (at least on the surface), deposited on sand, and also on gyttja.† Of the *Europhilus* species it is ecologically closest to *piceus*, while it often lives among tall but less dense vegetation (*Scirpus silvaticus*, *Carex*, etc.), and always in situations where the wet loam lies exposed at least in patches and the mosses therefore play a subordinate role. It tolerates well the moderate shade of *Salix* shrubs and solitary deciduous trees (for example *Alnus*); also found in places with sparse leaf litter. Often found together with *Bembidion dentellum*. In Central Europe not rare at the base of, or under the bark of *Salix* and other trees (WLK 1867, p. 8; FWL 1887, p. 93; JEA 1941–1942, p. 894). These might be the winter habitats of the species; PME found the species in autumn near Nl Helsingør under the bark of highly moldered *Alnus* stumps, next to a river bank.

### Biology

Southern Swedish catches: IV: 5; V: 10; VI: 22; VII: 2; VIII: 4; IX: 3; X: 4; XI: 1. In Denmark a definite autumn population (LRS 1939, p. 330). Immature beetles, July 28 (Boh) and in September (Små). It is thus undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. On June 3, 1941, 1 specimen (Sdm) was induced to flight upon exposure to sun under glass. Within the entire region the popu-

†(cf. page 69; suppl. scient. edit.).



lation of the species has markedly increased in recent decades, and thus it is probably a later immigrant.

### Fossil Records

Galicia, early glacial (LMN 1894, p. 29). Skåne, postglacial *Trapa-gyttja* (HNR 1933, p. 132).

75

*\*Agonum* (s. str.) *moestum* Dft. s. l.  
(including *emarginatum* Gyll.)

### Distribution

*Sweden*: Due to the earlier confusion with *viduum* s. str., the distribution is only partially known. With the exception of the southern Swedish highland, the species however seems to be distributed rather continuously from Skå to central Sweden. Known northernmost localities: Vrm Ölme (LTH); Vst Nora (LTH); Dlr Ludvika (WSL!); By, Fullsta (Palm!); Gst Hedesunda (Palm!); Upl Skutskär (LTH).

*Norway*: Only two definite localities to date: 1 Hvaler, 1 specimen (STE, MB!); 2 Oslo (SHY, MO!). All the other specimens examined by me erstwhile identified as "*moestum*" or "*emarginatum*", proved to be the dark form of *viduum*.

*Finland*: Definite specimens only from the Isthmus of Karelia near Ka Heinjoki, 2 specimens (PFF!); Ik Metsäpirtti and Pyhäjärvi (KRG!), and from the extreme southwest: Nl Borgå Skärgård, Brunskär, sea drift, June 20, 1935 (SUE, S.H.A. 1937, p. 213); Tvärminne (KRG!), in sea drift, several specimens (Frey 1937, "*viduum*", MH! STÅ 1938 "*viduum*"!). Al Kökar (FRS, MH! GRQ, coll. HLQ!).

*Russian sector*: Two localities immediately north of the mouth of Swir River, 1942 (PFF! Aftén, coll. HLQ!).

*Adjacent regions*: In Denmark, including Bornholm (LOH!) widely distributed and frequent (West 1940, p. 45). In Estonia several localities one of which is on the northern coast (HAB in litt.). Doubtful in Leningrad region. British Isles (Joy 1932, p. 367), also in Ireland (OMH 1929, p. 24).

*Total area*: Palearctic species. The data below is rather uncertain in part, since the species has often been confused with the dark form of *viduum*. In Europe, recorded south as far as central Spain (FUE 1920, p. 200), Corsica (DEV 1935, p. 57), central Italy, Sardinia, Sicily (LUI 1929, p. 134), Greece (APF 1904, p. 292). The Caucasus (ECH 1930b, p. 218; Puel 1938, p. 172). Siberia (among others, SBJ 1880, p. 38; RM!), east as far as Amur (HEY 1893, p. 16).

## Ecology

- 76 Compared with *viduum*, this is a fastidious species, living only alongside stagnant eutrophic waters, yet also found at the smallest ponds and largest lakes. It requires wet, more or less soft soil (especially loam or gyttja† and the rich vegetation of *Phragmites* and similar plants. Prefers the moderate shade of shrubs or deciduous trees. In Central Europe recorded particularly for forest swamps (BLK 1925, p. 35; GRD 1937, p. 44; JEA 1941–1942, p. 888).

## Biology

Swedish catches: II: 1; III: 4; IV: 6; V: 39; VI: 44; VII: 11; VIII: 14; IX: 12; X: 1. Immature beetles found on July 25, 1933 (Boh). Larvae and pupae, recorded as *viduum*, end of June to September (LRS 1939, p. 330), might belong in part to this species. In any case the species breeds in spring and hibernates as an adult.

## Dynamics

Wings rather variably developed. In the typical form "*moestum*" (sensu THS, see below) the apical part of the wing is reflexed; however, the wings are generally so short as to be useless for flight. On the other hand, in "*emarginatum*" the wings are always fully developed, and their functional capability is evident from flight observations: 1 specimen (Gtl) on May 23, 1940 induced to flight upon exposure to sun under glass; spontaneous flight observed by WGN (in litt.) near Berlin.

## Systematics

Earlier (1942a, p. 227; 1943a, p. 56) I treated the forms *moestum* s. str. (sensu THS) and *emarginatum* Gyll. as separate varieties of *viduum*. Subsequent studies of more extensive Fennoscandian material have led me to conclude that there is no natural boundary between the two forms. The known differences could largely be attributed to the reduction of wings in "*moestum* s. str.". In this regard mention may be made of *Pterostichus vulgaris* in which macropterous individuals are similarly differentiated externally by larger and, particularly, more attenuate and parallel-sided elytra. To the distinguishing characteristics of the penis given by me (1943a), separating this species from *viduum*, one may add that, according to JEA (1941–1942, p. 887), there are also constant differences in the apical part as well as in the right paramere. It therefore

†(cf. page 69; suppl. scient. edit.).

seems appropriate to consider "*moestum*" in its old concept "(sensu latiore), as specifically distinct from *viduum*."

## Fossil Records ?

Reported from interglacial deposits in Jylland (HNR 1933, p. 131) and Ång Härnön (MJB 1916, p. 7). The identifications must be considered uncertain.

*\*Agonum (s. str.) mülleri* Hbst.  
(*parumpunctatum* Fbr.)

## Distribution

*Sweden*: In the south continuously distributed as far as Hls. Farther north only three localities: Mdp Njurunda, 1936, 2 specimens (LTH); Ång Örnköldsvik, July 9, 1936, 2 specimens (LTH); Åsl Dorotea, July 23, 1936, 2 specimens (LTH). No distinct gaps in distribution.

*Norway*: Widely distributed in the coastal and forest regions of the south. The gap on the coast south of Trondheim Fjord is presumably fictitious. Northernmost localities: 8 Sönd Fjord; 13 Ringeby; 24 Dovre (SNR 1862, p. 327). Trondheim region (26, 27, 28) five localities (N.E.T. 1923, p. 276; 1937, p. 147); additionally 30 Grong.

*Finland*: Widely distributed in the south, probably without gaps. Northernmost localities: Om Gamla-Karleby (MH!); Vetil (NSL); Perho (SAR); Sb Kuopio (several collectors!); Kb Polvijärvi (PHJ!). Additionally, one old specimen from Ks Kuusamo (MKL, MH!), which may have been correctly labeled.

*Russian sector*: Southern Karelia, five localities, north as far as Kn Tiudie (PPP 1899a, p. 16; MH!).

*Adjacent regions*: Widely distributed and frequent in Denmark, and Bornholm (West 1940, p. 44). Estonia, among others from Ösel (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (among others, OBT 1876). British Isles (Joy 1932, p. 366), also Ireland (JHS and HLB 1902, p. 578).

*Total area*: Palearctic species. In Europe, south as far as southern Spain (FUE 1920, p. 199), southern Italy including Sardinia (LUI 1929, p. 133), Albania (APF 1904, p. 290). Azores (JEA 1941-1942, p. 886). The Caucasus (CHD 1846, p. 134; SDR and LDR 1878, p. 69). Western Siberia (HEY 1880-1881, p. 28; not mentioned by RTT 1907, p. 68).

## Ecology

Not distinctly a riparian species. Occurs on moderately moist loamy or loam-  
78 mixed soil exposed to sun, with often high but not too thick vegetation consisting of grass or weeds. Likes cultivated soils, for example, fallow land, refuse

dumps, and gardens, even in the city; often found in gravel pits. Adult does not require much humidity as often sighted on superficially totally dry fissured loam. Immature beetles on the other hand found in late summer in small dried up ponds, where apparently their development took place, and hence larval requirement for humidity presumably higher. Also on loamy banks, and solitary individuals in sparse deciduous forests. Distinctly heliophilous. Dahl's assumption (1928, p. 102) that the species likes humic acids is difficult to understand.

### Biology

Southern Swedish catches: I: 2; II: 0; III: 5; IV: 27; V: 57; VI: 43; VII: 17; VIII: 24; IX: 27; X: 8; XI: 2; XII: 1. It is quite apparent that the old generation declines in late summer. Immature beetles, July 31 (Små, Gtl) and in August. In Denmark, larvae found in July (LRS 1939, p. 329). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. One beetle induced to flight upon exposure to sun under glass. Spontaneous flight observed near Ögl Sturefors, April 17, 1942 (LNM!) and Gst Grönsinka (Palm).

### Variation

Aberrations in color have been noted and partially named. At least within the region under survey, variations of no zoogeographic interest.

### Fossil Records

Jylland, postglacial (HNR 1933, p. 130). Galicia, glacial (SCL 1916, p. 50). Doubtful record from Saxony, glacial (NTH 1894, p. 539).

\**Agonum (Euophilus) munsteri* Hellén  
(*consimile* auct. partim; *scitulum* auct. fenn. nec Dej.;  
see LTH 1943a, p. 61)

### Distribution

*Sweden:* To date only a few, widely separated localities: Vrm Östmark, bank of Tervalampi-träsk, August 5, 1911, 5 specimens (SAA, also in coll. LTH). Hls Färila, June 15, 1943, 1 specimen (LBL, RM!). Jtl Jormlien, moor next to lake, July 10, 1932, 21 specimens (JNS and Palm, E.T. 1936, p. 184!). Nbt



Älvsbyn, June 19, 1930, 1 specimen (LTH and Palm 1934, p. 37, "*consimile*"!); Luleå, Bergnästjärn, June 28, 1939, 2 specimens (LTH).

Erroneous: Two localities in northern Jtl (JNS and Palm l.c.; see *consimile*).

Norway: To date only two localities, both contiguous with the Swedish border: 10 Grue Finnskoga, near the church, August 7, 1911, 7 specimens (SAA!); 28 Innsjö (SBJ, RM, as *consimile*!).

Finland: According to HLL (N.E. 1935, p. 88) recorded only in the south and southeast. The following localities have been newly added: Nl Tvärminne, 2 specimens (BRK!); Ik Sakkola (KRG!); Ko Juuka, two localities (KRG! LBG! ELF); Ok Sotkamo (ENW, MH! HLL l.c., "*consimile*"). In Lapland, one isolated locality: Lk Kairila, 1937, 1 specimen (STN!).

Doubtful: Ka Hogland (HLL l.c.; no voucher specimen).

Russian sector: Southern part of the Kola Peninsula, one locality: Lv Varsuga (KLM, MÅ!). Farther south: Kr Suma (ENW, MH!); Kn Saoneskje Unitsa, 1 specimen, 1896 (PPP 1899a, p. 16, "*consimile*"; MH!); both records (HLL l.c.) published as *consimile*.

Adjacent regions: Known neither in Denmark nor the Baltic States. On the other hand, the species reported from Leningrad region (OBT 1876) as *consimile* certainly belongs here. Not found on the British Isles.

Total area: Palearctic species. In Europe, outside the region, only in northwest Central Europe: Germany, south as far as Hummelsberg in the Rhineland (coll. de Vries! Also see HOR 1941, p. 325); Holland, three localities (E.B.H. 1920, p. 268; 1939, p. 101; T.E. 1921, p. lxii; Museum Leiden! coll. Reclaire; and others!). Siberia, Kurejka in Yenisey region (SBJ 1880, p. 39, "*consimile*"; RM, 1 specimen damaged by Anthrenine feeding, must be referred to this species!). Lena region (PPP 1906b, p. 36 "*consimile*"; MH!). Probably the record from the Amur forest (BOD 1927b, p. 78) also belongs here.

## Ecology

Stenotopic on swaying *Sphagnum* carpets ("Bebeland") in small dystrophic lakes or ponds. I visited a loc. class., Ab Sammatti, in August, 1938 with KRG (where unfortunately no beetles were found), who later sent a complimentary description of the biotope. It is a very small lake, called Mustalampi, situated in a coniferous forest, but with totally open and unshaded banks, which consist of swaying hummocks and carpets of *Sphagnum amblyphyllum*.  
 80 The higher vegetation is moderately dense and includes (arranged according to frequency): *Carex limosa*, *C. rostrata*, *Menyanthes*, *Rhynchospora alba*, *Scheuchzeria*, *Andromeda*, *Oxycoccus*, *Drosera rotundifolia*. The carabid lives in the farthest shore zone, which can easily be submerged under water. Successive species: *A. gracile* and *Acylophorus wagenschieberi* Kies. according to HLL

(N.E. 1935, p. 88), and also *Lathrobium rufipenne* Gyll. and *gracile* Hpe. In Vrm the biotope (SAA in litt.) was completely identical. Near Nbt Luleå the species was found on the small, almost overgrown lake, Bergnästjärn. Continuous swaying *Sphagnum* cover with *Calla*, *Comarum*, *Menyanthes*, *Oxycoccus*, *Andromeda*, *Drosera rotundifolia*, *Carex limosa*, and *Naumburgia*. Successive species (arranged in order of frequency): *A. gracile*, *Bembidion doris*, *Pterostichus minor*, *P. nigrita*, and *P. diligens*. In Central Europe among *Sphagnum* in high moors ("Hochmoore") (Riehn, D.E.Z. 1914, p. 406; HOR 1941, p. 325; CPR in litt.); "a sphagnobiont glacial relict" (HOR 1935a, p. 37).

### Biology

The few Scandinavian specimens were collected in summer (June to August). In Finland, already numerous at the onset of spring, and found singly also in autumn (KRG in litt.). The fruitless search near Ab Sammatti in the beginning of August (see above) and, according to KRG (in litt.), also at other occasions in midsummer, indicates that during this time the species undergoes the larval phases and that, like all other species of *Europhilus*, *munsteri* hibernates as an adult.

### Dynamics

Wings fully developed. Species certainly with flight capacity but no corroborative observations.

\**Agonum (Platynus, Anchus) obscurum* Hbst. (nec Payk.)  
(*oblongum* Fbr.)

### Distribution

(map in LTH 1939a, p. 243)

*Sweden*: In the south widely and continuously distributed. The northern boundary is sharply defined, and lies rather near latitude 60° N. Northernmost localities: Vrm Arvika, 1933 (LTH); Torsby, 1925 (SVS); Råda, 1933 (Palm and LTH 1937, p. 119!); Herrhult, 1936 (LTH); Vst Grythyttan, 1936; Nora, 1936; Strömsholm, 1936 (LTH); Västerås, since around 1910 (SDN, MG! SLL, VA!); Upl Fiby, 1937 (BRD!); Uppsala, at least since 1915 (several collectors!); Erken, 1941, 1 specimen (LTH).

*Norway*: Only in the extreme southeast, north to the Oslo region, two localities, and 3 Fiskum, west along the coast as far as 5 Mandal.

*Finland*: Widely distributed in the south; gaps on the southern coast presumably fictitious. In the inland the species occurs in the far north; northernmost localities: Tb Keuru (PHJ); Viitasaari (HLL); Sb Kuopio (LEV, MH!); Kb Juuka, Juuanvaara, July 3, 1940, 1 specimen (KRG!).

*Russian sector:* Sv, immediately north of Swir estuary (PME! PFF!); Ku-  
ujarvi, 1943 (PFF!). Earlier only an old record from Karelia, without locality  
(PPP 1899a, p. 16).

*Adjacent regions:* In Denmark, including Bornholm, widely distributed and  
not rare (West 1940, p. 45). Estonia (HAB in litt.); Latvia (SDL 1872; ULN  
1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 366), also  
Ireland (JHS and HLB 1902, p. 578).

*Total area:* Circumpolar species. In Europe south as far as southern France  
(DEV 1935, p. 56), northern Italy (LUI 1929, p. 135), Yugoslavia (APF 1904,  
p. 288). The Caucasus (SDR and LDR 1878, p. 69). Kirgizia (HEY 1880–1881,  
p. 28). Western Siberia (among others, SBJ 1880, p. 40; RM! PPP 1907d, p. 23).  
North America (Leng 1920, p. 64).

### Ecology

Particularly typical of deciduous forests (more seldom in mixed forests), which  
have become marshy. The insect requires a distinct layer of humus ("Förna<sup>†</sup>"),  
damp to wet soil, and the strong shade of trees or shrubs; on the other hand  
the ground vegetation is often rather weakly developed. The deeper layers  
of the soil seem to be of less importance, since the species does not notice-  
ably differentiate between rubble, gravel, sand, and loam. Most numerous in  
stocks of *Alnus glutinosa*, especially in the vicinity of lakesides, where trees and  
stumps stand on socle-like ground elevations; here, the species prefers the wet  
foliage of the gullies between the elevations. Wooded bogs ("Bruchmoore")  
are also not avoided; however, the species lives here along the edges of bogs  
82 in foliage among *Sphagnum* hummocks where shade is sufficient, and which is  
the biotope described for *Trechus rivularis*. Also present in more humid beech  
forests and mixed deciduous forests. Occasional reports from open ground  
(banks, swamp meadows, etc.) might, at least in most cases, be attributed to  
spring floods. In Central Europe also inhabiting the biotope typical of our  
region (see Dahl 1925, p. 54); on the other hand the incidence of this species  
is apparently higher in *Sphagnum* moors, seemingly at fairly open places (Peus  
1928, p. 577; ROU 1934, p. 77; GRD 1937, p. 44).

### Biology

Swedish catches: I: 2; II: 2; III: 6; IV: 12; V: 46; VI: 141; VII: 64; VIII: 24;  
IX: 39; X: 14; XI: 5; XII: 1. In Denmark larvae and pupae were observed in  
August, and LRS (1939, pp. 331, 398) assumes that breeding takes place in  
spring, and that only adults hibernate. Swedish records of immature beetles  
show rather divergent conditions as they occur during two distinctly separated

<sup>†</sup>(Upper litter layer of the soil profile; suppl. scient. edit.).



periods. In April and May (April 9 to May 23) I saw a total of 14 immature adults, and 8 in autumn (September 13 to October 17), but none during the intervening period. It may be assumed that hibernation takes place in both the larval and adult stages. The strong increase in number of beetles from May to June (in Denmark less pronounced, from April to May) indicates that the latter case is more common. The record of a larva in a molehill (SLK, E.M. 1895, p. 115) is certainly coincidental.

### Dynamics

LTZ (1847–1852, p. 162) has already reported wing dimorphism in this species. Normally, at least in our region, the species is brachypterous with wings reduced to rudiments that are scarcely visible to the naked eye. Macropterous individuals, which occur singly among the other specimens and with no intermediate forms, have fully and normally developed wings and have undoubtedly flight capacity. However, because of their rare occurrence, they cannot play a significant role for the dispersal of the species. Nevertheless in Finland 17 beetles were found in sea drift (PME 1944, p. 39). Due to the fairly eurytopic nature of the species and its striking mobility (*per pedes*), its dispersal capability in forest regions has thus not been considered as poor.

83

### *\*Agonum (Europhilus) piceum* L. (*picipes* Fbr.)

#### Distribution

*Sweden:* Throughout southern and central Sweden; so far not known from Ble, but certainly not absent. On Öld and Gtl extremely rare, on Gtl found only in the east. Northward the species extends into Jtl and into southernmost Lapland; on the Bothnian coastland widely distributed in Nbt, while in Vbt found in just two localities, and from Ång not known to date. There might be an actual gap in distribution here; at any rate the species is much more frequent in Nbt than farther south. Delimiting localities in the north: Dlr Orsa (UYT 1909, p. 298, and in litt.). Hls Los, 1943; earlier searched for in vain (SJB). Jtl Svenstavik, July 1943 (LDN); Ånn, June 13, 1934, 1 specimen (LTH); Frösön, July 28, 1936, 1 specimen (LTH); Ragunda (FRI, 2 specimens VA!); Bispgården, 1930, numerous (LTH and Palm 1934, p. 38!). Åsl Åsele, October 1883, June 1886 (coll. TIM, LU!); Dorotea, July 23, 1936, 5 specimens (LTH); Vilhelmina, July 21, 1936, 6 specimens (LTH). Vbt Holmsund, July 11, 1936, numerous (LTH); Lövänger, July 13, 1936, 3 specimens (LTH). Nbt Piteå, July 16, 1936, frequent (LTH); Harads, bank of river, June 22 and 24, 1938, numerous (LTH); Tärendö, 1942, 1 specimen (A. Rautio, coll. LTH); Korpilombolo, June 27, 1938, 1 specimen (LTH); Sattajärvi, July 28, 1938 (LTH). Lul Pålkem, June 24, 1941, 1 specimen (WRN!).



Doubtful: Tol Karesuando (GPE, according to ZTT 1840, p. 43). Probably in Finland.

Erroneous: Ång Tåsjö (CDG, E.T. 1931, p. 164, = *fuliginosum*!).

Norway: Partly in the coastal regions of the south, northwest as far as 6 Nedstrand and Suldal in Ryfylke (HLS 1915, p. 25), northeast as far as 2 Ringerike and 12 Gran; in part completely isolated from the aforementioned, three localities on the Trondheim Fjord: 27 Trondheim; 28 Nesvatn in Skogn and Steinkjer, "frequent" (N.E.T. 1923, p. 276; 1937, p. 147). This detached area is connected with the Swedish area through Jtl.

Finland: Distributed throughout the country except the extreme north; presumably only a fictitious gap in the inland of the southeast. Northernmost localities: Le Karesuando (SBJ 1873, p. 122); Lk Muonio and Kittilä (MER, MÅ!); Kairila (STN); Ks Salla (KRG! KNG).

Russian sector: Kola Peninsula, two localities in the west, the northernmost Lt Lutto (PPP, FA, as "*gracile*"!); two localities in the south, east as far as Lm Umba (PPP 1905, p. 93; MÅ!). In Karelia numerous localities in 84 Sv (several collectors!), farther north near Kn Juustjärvi (PPP 1899a, p. 16; MH!).

Adjacent regions: In Denmark, including Bornholm, widely distributed and not rare (West 1940, p. 46). Estonia (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 579).

Total area: Palearctic species. In Europe south as far as central France (DEV 1935, p. 57), northern Italy (LUI 1929, p. 136), and Bosnia (APF 1904, p. 296). Northeast as far as Mezen (PPP 1908, p. 6). Western Siberia (among others, SBJ 1880, p. 39; RM! PPP 1907d, p. 24).

### Ecology

An exclusive riparian species, and found on large lakes as well as the smallest ponds, slow-flowing waters, and less often brackish water. It requires loamy soil or at least an admixture of loam, and abundant, often high, vegetation of *Carex*, *Scirpus*, *Glyceria*, *Equisetum*, and similar plants. The species is not found with pure *Sphagnum*, and generally prefers situations where exposed loamy or gyttja† surfaces are present under the plant cover, thus mosses play a subordinate role. It tolerates moderate shade from bushes or solitary trees but evidently prefers warm places exposed to the sun (often with putrid water). However, it does not have the same requirement for eutrophic waters as *thoreyi*. Records by the sea under seaweed (among others, West 1940, p. 46) may have been drift specimens.

†(cf. page 69; suppl. scient. edit.).

## Biology

Southern Swedish catches: I: 1; II: 4; III: 3; IV: 16; V: 36; VI: 41; VII: 11; VIII: 8; IX: 8; X: 8; XI: 2; XII: 2. Immature beetles found on July 16 (Nbt) and July 25 (Boh). In Denmark, larvae found in July and August (LRS 1939, p. 330). Undoubtedly breeds in spring and hibernates as an adult.

## Dynamics

Wings fully developed. Spontaneous flight has been observed many times: Nbt Notviken, September 6, 1938, 2 specimens (LTH); Ab Lojo, 1938, 2 specimens (KRG); Ks Paanajärvi, June 16, 1939 (PFF 1943, p. 105).

## Fossil Records

Jylland, postglacial, two localities (HNR 1933, p. 132). Also, a doubtfully identified postglacial record from Finland, Oa (Andersson 1898, p. 143).

85

\**Agonum* (s. str.) *quadripunctatum* De G.

## Distribution

*Sweden*: Species recorded from most provinces, but apparently has no continuous distribution. Some records are old, and occurrence seems to have declined in recent years. Skå Ringjön, 1881, 1 specimen (MLC, HM!); Skärålid, 1885, 1 specimen (MLC, HM!); Hälsingborg, 1928, 1 specimen (ARV!); Broby, 1885, 1 specimen (MLC, HM!). Små Almhult, 1860, 1 specimen (Roth, HM!); Kalmar, old specimen (WLN, LG!); Hornsö, 1942, 1 specimen (Palm!). Göl Visby, 1 specimen (JNS, E.T. 1915, p. 204!), 1928, 1 specimen (LTH); Licker-shamn, 1934, 1 specimen (LOH, MG!); Fårön (JNS); Sandön, 1922, numerous specimens from seashore, and certainly coincidental (JNS 1925, p. 68!). Vgl Göteborg, single specimens, but much earlier collected many times and by several collectors in the streets of the city (MG!); Mölndal, before 1920, 8 specimens (ERC, MG!); Donsö, 1930, 1 specimen (ARV!); Vänersborg, 1 specimen (RGS!). Ögl (WBG, 1 specimen, RM! BOH, coll. THS, 1 specimen, MB!), Västra Ny, 1852 (HGN 1853, p. 17). Nke (leg. ? 1 specimen, MG!). Sdm (leg. ? 1 specimen, RM!). Stockholm, single specimens from numerous collectors, the last 1918 and 1924 (ING, coll. LTH), 1930 and 1934 (OLS!). Upl Runmarö, 1906, 1908, 1 specimen each (HFS, LÖ!); Uppsala (several collectors!); Hacksta, circa 1922 (ING, coll. LTH). Vst (JHN, according to the note in his "Grill," LV). Vrm, probably Segerstad (CDS 1873, p. 18). Dlr Falun, 1916 (TJB!), 1917 (KLF); Torsång, Tomnäs, 1924, 1 specimen (KRZ, coll. KLF); Lima, 1930, 1 specimen (OLS!); Transtrand, 1937 (RGS!); Hamra, 1927, 1 specimen (JNS and SJB 1932, p. 17!). Gst Gysinge, 1935, 1 specimen

(LTH); Furuvik, 1942, 1 specimen (OLS). Hls (2 old specimens, STH, MG!), Los, 1925–1942, 12 specimens (SJB); Ramsjö, 1943 (LDN). Mdp Boda, Paljacka, 1935, 1 specimen (BRC, RM!). Vbt Hällnäs, 1937, 1 specimen (HEQ!). Nbt (2 old specimens, LPA, VA!), Karl-Gustav, 1941, 1 specimen (SJB). Lyl Umgransele, 1943, numerous (B. Persson!); Barsele (ZTT 1840, p. 43); Sorsele, 1931, 1 specimen (GTZ!). Lul Pållem, 1941, 2 specimens (WRN!).

*Norway:* Few localities in the southeast: 1 Dröbak; 2 Oslo region, several localities (SIE 1875, p. 101); 4 Kragerö and Risör; 12 Hamar (SHY 1879, p. 20) and Gjøvik; 16 Sande (SHY l.c.); 25 Aursund (N.E.T. 1937, p. 147). The locality of 32 Saltdal, Storfjord (SPS, MT, according to STA) is totally isolated.

*Finland:* In contrast to Scandinavia, the species here is almost uniformly distributed throughout the country except, for the extreme north, and not rare 86 in some regions. From the Skärgård of Ål however there are only two records: Eckero (FRS, MH!); Kökar, Idö (STK). Northernmost localities: Lk Kittilä (KRG); Sodankylä (KNG); Li Ivalojoiki (SBJ, PPP 1905, p. 92; MH!).

*Russian sector:* On the southern coast of the Kola Peninsula one locality: Ly Kusomen (PPP l.c.; MH!). In Karelia, especially in the south, numerous localities and distribution definitely continuous; northernmost near Kk Soukelo (PPP l.c.; MÅ!).

*Adjacent regions:* In Denmark sparsely represented and rare, but found in eastern Jylland as well as on the islands, including Bornholm (West 1940, p. 43). Estonia (among others, SDL 1891); Latvia (SDL 1872; ULN 1884; HEY 1903). Leningrad region (OBT 1876; JAC 1908, p. cxxxviii). British Isles, only in England (Joy 1932, p. 367).

*Total area:* Almost a cosmopolitan species. In Europe predominantly northeastern, west as far as western Germany (HOR 1941, p. 311), England (see above) and region of Paris (DEV 1935, p. 56); south as far as the Pyrenees (DEV l.c.), northern Italy (LUI 1929, p. 132), Bosnia (APF 1904, p. 290). Iran (BOD 1927c, p. 39). Siberia (among others, SBJ 1880, p. 39), east as far as Lena (PPP 1906b, p. 36) and Kamchatka (BNN, NET, SBR 1929, p. 4). Tibet (CKI 1927–1933, p. 823). North America (Leng 1920, p. 64). British India; the Philippines (CKI l.c.).

### Ecology

The mode of life of this species is very unusual and in this respect it is similar to *Pterostichus angustatus*. Often found in forests where it exhibits a marked tendency to appear in large numbers, often suddenly, in burned-out places, and likewise in and around human dwellings. This kind of occurrence is known particularly from Finland (SBJ 1916; SAA 1917, p. 288) and England (E.M.M. 1915, p. 330; 1916, pp. 89, 158; 1917, p. 127; 1918, p. 26; 1922, p. 249), but is also seen in Germany (SAA 1923, p. 636; HOR 1941, p. 312), France (JEA



1941–1942, p. 874), and Italy (MÜL 1926, p. 246). The occurrence of this species in and around buildings is substantiated particularly from the northern parts of the area of distribution: Sweden (by far the greatest number of records), Finland (SAA 1923, p. 636), Denmark (MEI, E.M. 1887, p. 39; West 1940, p. 43), northern Germany (SRN 1926, p. 28; HOR l.c.). In my opinion there are two possible explanations for this dual incidence: either the species is  
 87 chemically attracted to burned wood, or it lives in rodent nests. This conjecture has already been broached (LRS 1939, p. 392; West l.c.) and envisions that the mass occurrence of these carabids in burned-out forest places is due to their being driven out from rodent nests by fire. But the mode of their appearance at the scene of a fire in no way confirms this supposition. SBJ (1916) reports that *quadripunctatum* was observed in large numbers in autumn at a place near Helsinki, which was the scene of a fire in the spring of that year (which per se is compatible with the “mouse theory”), but it still occurred at this place throughout the following summer. This mobile carabid would hardly have experienced difficulty in finding new rodent nests during the intervening period. Furthermore, no one has succeeded to date in collecting a specimen of *quadripunctatum* from the nests or galleries of animals, in spite of diligent efforts to do so. Lastly, KNG informed me that he found three specimens near Kn Aunus in 6.0 m height on a pine tree damaged by fire, one of which was quite immature and had apparently undergone development at that location. It therefore seems likely that the species is chemically connected with the presence of burned wood or wood ash, which indeed is present in sufficient quantities in and around human dwellings.

### Biology

Records from Sweden and Finland (SAA 1917, p. 1923) are distributed as follows: III: 1; IV: 5; V: 11; VI: 14; VII: 17; VIII: 12; IX: 12; X: 3; XI: 0; XII: 1. Catches are fairly uniform throughout summer. In Denmark most specimens were collected in June (LRS 1939, p. 329). However, it seems to me that no inferences can be drawn from this data about the breeding period. Nevertheless since an immature beetle was found near Kn Aunus on July 26, 1942 (KNG), one may assume that the species breeds in spring and hibernates as an adult.

### Dynamics

Wings fully developed. Spontaneous flight has been observed: Hls, Los, August 20, 1942 (SJB); Lul Pållem, June 1942 (WRN); Bornholm, July 1924 (RSB, according to West in litt.); Bavaria (HOR 1941, p. 312). Repeated occurrences on the seashore, for example on Gotska Sandön (JNS 1925, p. 68) and in eastern Prussia (HOR l.c.) certainly represent drift material. In Finland nine



specimens were found in sea drift (PME 1944, p. 39). Generally speaking the capability of dispersal of this species may be considered very good.

*\*Agonum (Platynus) ruficorne* Gze.  
(*albipes* Fbr.)

Distribution  
(map in DEV 1930, p. 117)

*Sweden*: On the southern and western coasts continuously distributed from Ble to Boh, then found near Små Kalmar (WLN, LG!), as well as on Öld and Gtl. Widely distributed in the central Swedish plain, especially around lakes Vättern and Mälaren; south as far as Små Jönköping (POR, LJ!), west as far as Vgl Kinnekulle (several collectors!) and Vrm Alster (ZRN!), north as far as Upl Uppsala (several collectors) and Dlr Smedjebacken, one specimen on the bank of Kolbäcksån, June 29, 1918 (CDG!), and east as far as Upl Värmdön, Skägga (LTH) and Ögl Krokek (LOH, according to JNS) and Kvillinge (WSJ!).

*Norway*: Exclusively on the coast of the Swedish border (also on the inner part of Oslo Fjord) to the region of Bergen (several localities, frequent; SPS 1875, p. 22; 1901, p. 44; N.E.T. 1930, p. 338!). Farther north only near 26 Vällersund, July 8, 1915, 1 specimen (HSS in litt.). The gap in the extreme south is presumably fictitious.

Doubtful: Trondheim (MOE, according to SHY 1879, p. 20; not accepted by MST and LYS).

*Finland*: Only in three small, limited regions on the southern coast: I. Åbo region, three localities (several collectors!). II. Helsinki region, three localities (several collectors!). III. Ka Viborg (MKL, MH!), three localities west of Ik, close to the Russian border (KRG! STN! WEG!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and not rare (West 1940, p. 45). Estonia, in the west and south (SDL 1872; HAB in litt.; Palm!); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 366), also frequent in Ireland (JHS and HLB 1902, p. 578). Shetland (West 1930, p. 75).

*Total area*: Amphi-Atlantic species. In Europe south as far as southern Spain (FUE 1920, p. 201), Corsica (DEV 1935, p. 56), southern Italy, including Sardinia, Sicily (LUI 1929, p. 135), and Yugoslavia (APF 1904, p. 288). In Russia east as far as Kazan (JAC 1905–1908, p. 328). Northern Africa (BED 1895–1914, p. 248). Canary Islands, Madeira, Azores (JEA 1941–1942, p. 876). Asia Minor (BED l.c.; BOD 1927a, p. 30). Eastern North America (Leng 1920, p. 64).

## Ecology

An exclusive riparian species. Mainly found at the sea and larger lakes (eutrophic as well as oligotrophic), less often by the side of flowing or small bodies of stagnant water. The species is rather peculiar in occurrence, generally numerous at one place yet in other quite similar locations totally absent. Soil condition seems to be of special importance and should include some loam-mixed sand (or fine gravel). Shores inhabited by this species are mostly barren or with very sparse overgrowth and generally quite open; nevertheless the moderate shade of trees or overhanging steep banks are not avoided. The species lives right at the water edge, usually under the alluvial deposit. In Central Europe the species seems to occur more along river banks more often (RTT 1908, p. 144; GRD 1937, p. 44) than in our region.

## Biology

Swedish catches: IV: 5; V: 23; VI: 22; VII: 22; VIII: 10; IX: 5; X: 2; XI: 0; XII: 1. Numerous immature beetles from August 10 (Skå, 1924) to September 9 (Ögl, 1934). The data are thus typical for a spring breeder and adult hibernation. Its absence in early spring is explained by late emergence from winter hiding; at any rate one has to assume that the adults which emerge in August and September hibernate in winter and breed only the following spring. In Denmark (LRS 1939, p. 331) the conditions differ only to the extent that young beetles have already begun to emerge from pupae in July, and thus cause a significantly higher autumn population. Larvae were observed from end of May to end of September. The arguments adduced by LRS (l.c., p. 397) that most of the specimens hibernate in the larval stage are not convincing. One can assume that in autumn the beetles bury themselves in the ground of the same barren shores on which they live. No one collects at such places in winter. If the beetles emerge late from their winter hideouts, the same (apparent) yearly distribution of adults will result.

## Dynamics

Wings fully developed, but remarkably short; no larger than in the considerably smaller species, *piceum*. It is therefore not certain whether they are functional; 90 repeated exposure to the sun did not induce flight. The occurrence of this species in drift material collected from the surface of lake Ladoga could have resulted from their being washed off the banks.

*Agonum* (s. str.) *sahlbergi* CHD: This species was reported by me (LTH 1931, p. 555) from Scandinavia on the basis of a specimen from Lyl Sorsele (GTZ!). It was not possible for me to examine a specimen of this species, said to be collected in Scotland and Siberia. However, BLR compared the specimen in question with Scottish specimens in the British

Museum and concluded it is conspecific. The specimen from Sorsele meanwhile proved to be an aberrant form, but beyond doubt conspecific with *dolens*, a species not known from the British Isles. I therefore consider it highly possible that the Scottish "*sahlbergi*" likewise belongs to *dolens*.

*Agonum (Euophilus) scitulum* Dej.: The "*scitulum*" of THS is actually *micans* Nic. But a specimen of a true *scitulum* Dej. labeled "Suecia" was found in the ERC collection housed in MG! A definite confusion of localities has occurred here. *A. scitulum* is also absent from Denmark; the nearest locality is near Hamburg (HOR 1941, p. 323). The record from Norway is likewise wrong (MST, N.E.T. 1933, p. 271).

\**Agonum* (s. str.) *sexpunctatum* L.

Distribution

*Sweden*: Distributed almost throughout the country except for true fjelds†. However, more sparsely distributed in the southeastern coastal region (Små, Ögl, Sdm) and the lower Norrland (especially in Hls and Jtl). It is especially frequent and widely distributed in Väner province and Nbt. The highest localities toward the fjelds are: Vrm Vingäng (Palm and LTH 1937, p. 118!). Dlr Lima, Tandberget, numerous (OLS!); Orsa (UYT 1909, p. 297, and in litt.). Hls Färila (LBL, RM!) Ljusdal (SJB). Mdp Vattjom (ADZ, LD). Jtl Revsund, May 2, June 5, 1943 (BGW); Ragunda (FRI; 2 specimens, VA!); Bispgården, 1 specimen (LTH and Palm 1934, p. 37!). Ång Hoting, 1 specimen (LTH). Åsl Dorotea, numerous (LTH); Vilhelmina, frequent (LTH). Stalon, 1 specimen (LTH). Lyl Storuman, 2 specimens (LTH); Sorsele, 3 specimens (GTZ, E.T. 1932, p. 53!). Pil Arjeplog (see RGS, from JNS); Loholm, several specimens (PRS, ML! WLD, coll. LTH). Lul Jockmock, July 1924, 1 specimen (LTH). Tol Vittangi, July 29, 1938, 1 specimen (LTH).

*Norway*: Widely distributed and frequent in the south and southeastern parts. Along the southern coast west as far as 6 Jæren, Sole, 1 specimen (HLS 1915, p. 23). Additionally, two isolated localities on the innermost part of the Sogne Fjord: 19 Årdal and Lærdal. Northernmost localities: 24 Sörem  
91 in Vågå; Dovre, Hjerkin (SIE 1875, p. 100); 11 Femundssund (Palm and LTH 1937, p. 118!). In the north completely isolated: 32 Saltdal (SMM 1824–1827, p. 98). The record is more than 100 years old, but is certainly not improbable, considering the Swedish region being close. This characteristic species cannot be confused with any other.

*Finland*: Distributed throughout the entire country except the extreme northernmost parts. Frequent in southern and central Finland. Northernmost localities: Lk Muonio (SBJ 1873, p. 117); Pallastunturi (MER, MÅ!); Kittilä (KRG; MER, MÅ! HLM, coll. STK); Li "Lac. Inari" (PPP, MH!).

*Russian sector*: Absent from the Kola Peninsula, but extends into Karelia

†(cf. page 48; suppl. scient. edit.).



north as far as Kk Soukelo (MH!) and Fedosersk (PPP 1905, p. 92). Also along the White Sea: Kr Suma (PPP 1899a, p. 16; MH!). Frequent in the south.

*Adjacent regions:* In Denmark, including Bornholm, widely distributed but not frequent (West 1940, p. 43). Estonia, including Ösel (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 367).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 198), southern Italy (LUI 1929, p. 132), Bulgaria (APF 1904, p. 290). The Caucasus (SDR and LDR 1878, p. 69). Siberia (among others, SBJ 1880, p. 38; RM!), east as far as Lena (PPP 1906b, p. 35) and Ussuri (MDL 1931, p. 5).

### Ecology

Found on humid grassy soil, often in the vicinity of banks but also entirely independent of them. Always in open places exposed to the sun, with dense but short vegetation, especially grasses or *Carex*, and below them mostly fine short moss (rarely *Sphagnum*). Otherwise remarkably eurytopic; the species apparently seems to prefer loamy soil, but the main components of the soil are often sand or gravel, even rubble; sometimes occurring on almost pure peat soil. In forest regions found in clearings and fringes. Avoids cultivated soil, but is often found on balks between fields. Markedly heliophilous. Preference for loam has also been noted in Central Europe (E.B. 1922, p. 36; GRD 1937, p. 42).

### Biology

Southern Swedish catches: II: 2; III: 2; IV: 10; V: 37; VI: 71; VII: 18; VIII: 21; IX: 7; X: 1. The sudden decrease from June to July is very pronounced. Numerous immature beetles found from July 17 (Nbt) to September 6 (Ble); copulation observed on May 10 (Gtl) and May 24 (Små). In Denmark larvae were recorded in July (LRS 1929, p. 329). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Definitely with flight capacity but oddly and to my knowledge no corroborative data available. During exposure to sun under glass a female (Gtl, May 1940) once prepared for flight by spreading the elytra and unfolding the membranous wings, then became uneasy and desisted. Repeated occurrence in sea-drift material in Finland (Frey 1927, p. 437; STÅ 1938, p. 19; PME 1944, p. 39) also indicates flight capacity.



\**Agonum (Euophilus) thoreyi* Dej.  
(*pelidnum* Gyll., Thoms. nec Dft.; *micans* Grill nec Nic.;  
*puellum* Dej.)

Distribution

*Sweden:* Distribution highly discontinuous. Occurring all over Skå, then several localities on the west coast, and especially frequent in the Göteborg region. In Ble near Karlskrona numerous in 1943 (SDH!); in Små only near Kalmar (WLN, LG!); on Öld near Byxelkrok, June 8, 1943, 1 specimen (BRK!); Hornsjön, 1922, 1 specimen (JNS!); Södra Möckleby, 1928, 1 specimen (LOH, according to JNS); late discovered on Gtl: Irevik, seashore, May 29, 1940, 1 specimen (LTH); Tingstäde, lakeside, May 10, 1940, 18 specimens (LTH); Boge, Tjelders, June 13, 1942, 2 specimens (BGW!). Distributed over a broad zone across the central Swedish plain and frequent almost everywhere. Delimiting localities: southward—Vgl Vänersborg, 3 specimens (SVS!); Dagsnäs, 1 specimen (WRN!); Ögl Omberg region frequent (Palm and others!); Kungsbö (LNM!); Östra Skrukeby (LBÅ!); Sdm Varnebysskär near Oxelösund (BRC!). Westward—Dsl Bolstad, 1 specimen (LTH); Vrm Säffle; Ekenäs; Grums (LTH). Northward—Vrm Lundsberg, 1 specimen (WRN!); Dlr Ludvika, 1 specimen (WSL!); By†, numerous (Palm), Gst Storsjön (several collectors!); Hamrånge, 4 specimens (LTH). Two quite isolated localities in Nbt: Piteå, July 16, 1936, 1 specimen after searching for two hours (LTH); Råneå, June 15, 1930, numerous (LTH and Palm 1934, p. 38!).

Doubtful: Lapland ("D. Fellman teste D. Sahlb.," ZTT 1840, p. 43).

Erroneous: Jtl (BOH, 1 specimen RM = *fuliginosum*!).

*Norway:* Within three widely separated regions: I. Extreme southeast: 1 Hvaler (MO!); Fredrikstad, several specimens (WOL, MO!); 2 Oslo region, several localities (HLS 1891a, p. 17, and other collectors; MO!). II. 32 Salten (HAG, according to SPS 1888–1889, p. 115). III. 41 southern Varanger, Vaggatam (MST). Unfortunately I could not examine voucher specimens from the last two localities.

*Finland:* Widely distributed in the southwest (also Al), north as far as St Björneborg (LBG), and east right into Helsinki region (numerous collectors!). In the southeast, north as far as Kb Pielisensuu 1942 (LBG!) and Liperi, 1 specimen (PME!), west as far as Ka Viborg (MH!), and also on Hogland Island (KRG! HLL!). The gap on the southern coast might be real. Farther north, several localities on the Bothnian coastland between Oa Vasa (RDL, det. HLL; LGB, coll. STK) and Om Jakobstad (LBÅ, FA!); according to SBJ (1873, p. 123) also near Ob Uleåborg (NYL) and Lk Muonio, "*saepius captus*" (1871b, p. 405; 1873, p. 123; MH! coll. SAA! However, see *Acupalpus dorsalis* and *Bembidion ustulatum*).

† (= misprint in the original German version; suppl. scient. edit.).

Erroneous: Ks Kuusamo (HLL; PFF 1943, p. 122; = *fuliginosum*!).

*Russian sector*: Only in southern Karelia: Kn Juustjärvi (PPP 1899a, p. 17); Sv Sermaks (PPP l.c.); Gubaritsa, 1942 (PME!).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and fairly frequent (West 1940, p. 46). Estonia, including Ösel and Dagö (SDL 1891; MIK 1905); Latvia (MIK l.c.; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 580).

*Total area*: Palearctic species. In Europe south as far as southern France and Corsica (DEV 1935, p. 57), central Italy and Sicily (LUI 1929, p. 136), Albania (APF 1904, p. 296). In the northeast, according to SBJ (1898, p. 339) as far as Pechora, which however needs to be re-examined. Asia Minor (BOD 1927a, p. 30). The Caucasus (SDR and LDR 1878, p. 69; LSH 1936, p. 142). Siberia (among others, SBJ 1880, p. 39, "*puellus*"), east as far as Lena (PPP 1906b, p. 36), Ussuri (MDL 1931, p. 5), Amur (HEY 1880–1881, p. 30). Northern Mongolia (PPP 1907d, p. 24).

### Ecology

On exposed banks of standing eutrophic waters, large lakes as well as very small ponds, hence living on loamy soil. Especially on very wet gyttja† with  
 94 rich and tall vegetation such as *Phragmites*, *Typha latifolia*, *Iris*, and similar plants, but with less prominent or totally without moss cover. Lives at the extreme edge of the shore, generally as the sole representative of *Europhilus*, often on quaking land ("Bebeland") or together with *Odacantha* and *Paederus riparius* L. on piles of *Phragmites* submerged in water. A typical biotope has been described from Upl (LTH 1943b, p. 123). At variance with the foregoing are the solitary occurrences in *Sphagnetum* (LTH and Palm 1934, p. 17; RNK 1938, p. 69). However, occurrence at the seaside (S.E.Z. 1921, p. 188; West 1940, p. 46) is certainly only coincidental. In winter often found in leaf sheaths of *Typha* and *Iris* (OMH, E.M.M. 1928, p. 150; Palm, E.T. 1930, p. 259; HOR 1941, p. 326).

### Biology

Swedish catches: I: 2; II: 5; III: 6; IV: 19; V: 49; VI: 56; VII: 18; VIII: 10; IX: 11; X: 9; XI: 4; XII: 3. In Denmark there are no records at all for July and August; larvae have been observed from July to September (LRS 1939, p. 331). LRS (l.c., p. 396) thus considers *thoreyi* a typical spring breeder, hibernating as an adult. However, in Upl I observed immature beetles not only during the entire autumn from August 31 to October 19, but also in large numbers

†(cf. page 69; suppl. scient. edit.).

during spring between April 16 and May 15 (LTH 1943b, p. 144), and also on Gtl on May 10, 1940. It may therefore be assumed that the species, at least in the north, hibernates to a lesser degree as larvae as well.

### Dynamics

Wings fully developed. One beetle induced to flight on May 31, 1940 (Gtl) upon exposure to sun under glass. The above-mentioned coincidental record at the seaside as well as the occurrence in sea drift in Finland (Frey 1937, p. 437; PME 1944, p. 39) indicate spontaneous flight.

### Variation

The species *thoreyi* and *puellum*, formerly considered separate (for example by SDL 1891, p. 29), are no more than poorly demarcated color aberrations (see also HOR 1941, p. 326). Both forms, as well as several intermediate variations, are found at random in central Sweden; only conspicuously dark individuals have been found in the two northern Swedish localities. I do not think that geographic races are involved here.

### Fossil Record

Denmark, postglacial (HNR 1933, p. 133).

95

*\*Agonum* (s. str.) *versutum* Gyll.

### Distribution

*Sweden*: Widely distributed in the south and absent only from certain regions, for example, in Skå (except Ångelholm, RNG, ML!) only in the inland, and in Hll only one specimen (Fjärås, ERC, MG!) has been found. On Öld rare (12 specimens), on Gtl only in the east. The two gaps on the east coast, south and north of Mälar, might not be real. Northernmost localities: Vrm Höljes (Palm and LTH 1937, p. 118!). Dlr Lima, 1 specimen (OLS!); Orsa (UYT 1909, p. 298, and in litt.). Hls Färila (LBL, RM!); Delsbo (RUD, MG!). Mdp Njurunda (LTH). Ång Mellån, 1939, 1 specimen (BRC, RM!). Jtl (BOH, 2 specimens, RM!), Svenstavik, July 1943 (LDN). It is not certain whether a continuous connection exists farther north. In Nbt the species is not rare, while in Vbt there are only two localities: Lövånger, 1936, 2 specimens (LTH) and Hällnäs, 1937, 1 specimen (HEQ!); in northern Ång: Tåsjö, 1927, 2 specimens (CDG!) and Hoting, 1936, 3 specimens (LTH). Northernmost Swedish localities: Lul Pålkem, 1941, 1 specimen (WRN!); Nbt Harads, 1938, 1 specimen (LTH); Över-Kalix, 1930, 2 specimens (LTH and Palm 1934, p. 37!), 1938,



1 specimen (LTH); Över-Torneå, 1930, 1 specimen (LTH and Palm 1934, p. 37!), 1938, 1 specimen (LTH).

Erroneous: "Lapp. bor." (BOH, 1 specimen, RM = *dolens*!).

*Norway*: Only in the southeast, but here widely distributed. West along the coast as far as 5 Kristiansand and 17 Hegeland, north as far as 13 Ringeby, 12 Ringsaker, and 10 Elverum (SIE 1875, p. 101). No gaps in distribution.

*Finland*: Rather widely distributed in the south, including Al, becoming more and more scarcer toward the north. On the Bothnian coast only one single locality known: Om Gamla-Karleby (MH!). Also found near Ob Yli-tornio (RNK, MER, MÅ!) on the Torne River, in close connection with the Swedish area which otherwise and strongly enough has no distinct connection eastward. Northernmost localities in the inland: Ok Säräisniemi (WUO, MH!) and Ristijärvi (HLL).

*Russian sector*: Only in southern Karelia, but from several localities (PPP 1899a, p. 16), northernmost near Kn Kumsjärvi (THG, coll. LBG!).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed but 96 rather rare (West 1940, p. 44). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 367), also Ireland (JHS and HLB 1902, p. 579).

*Total area*: Palearctic species. In Europe south as far as central France (DEV 1935, p. 57), northern Italy and Sicily (LUI 1929, p. 133), Bosnia (APF 1904, p. 291). The Caucasus (RTT 1907, p. 70). Siberia (among others, SBJ 1880, p. 38; RM! MÅ!), east as far as Amur (HEY 1893, p. 16).

### Ecology

An exclusive riparian species. Stagnant or slow-flowing, often quite small bodies of water, on slushy (often loamy), soft soil. Always on flat, more or less exposed shores rich in vegetation—*Carex*, *Glyceria*, and other grasses—and generally dense, wet moss cover (for example *Amblystegium*, not *Sphagnum*), often on quaking land ("Bebeland"). Tolerates moderate shade and hence also lives at more exposed forest ponds. Often found together with *Blethisa*. In Denmark and Central Europe apparently more a forest species than with us (West 1940, p. 44; Rapp 1933, p. 135; GRD 1937, p. 44); also in high moors (HOR 1941, p. 319).

### Biology

Southern Swedish catches: III: 1; IV: 5; V: 25; VI: 58; VII: 19; VIII: 5; IX: 3; X: 1. Consequently a very pronounced early summer species. Numerous immature beetles collected between July 11 (Ble) and August 10 (Sdm). In Denmark larvae observed in June and July (LRS 1939, p. 330). Spring breeder, hibernating as an adult.



## Dynamics

Wings fully developed. On June 23, 1940 (Gtl) one specimen was induced to flight upon exposure to sunlight under glass. In Finland two beetles were found in sea drift near Tvärminne (Frey, MH!).

*\*Agonum (s. str.) viduum* Panz.

(*obscurum* Payk. nec Hbst; also compare *moestum* above)

## Distribution

*Sweden*: In the southern and central parts frequent all over, and uninterruptedly distributed along the Bothnian coastland as far as the Finnish border. 97 Absent in the fjelds and higher parts of coniferous forest regions. Delimiting localities: Vrm Långflon (Palm and LTH 1937, p. 118!). Dlr Älvdalen, Loka (KLF); Hamra (SJB!). Hjd Kolsätt (SJB!). Jtl Berg (LDN); Östersund (FHL!); Frösö (LTH); Sundsjo (BGW). Ång Mo and Undrom (BRC, RM!). Vbt Hällnäs (HEQ!); Vindeln (LTH and Palm 1934, p. 37!); Byske (LTH). Nbt Älvsbyn (LTH and Palm l.c.); Harads, numerous (LTH); Över-Kalix (LTH and Palm l.c.); Pajala (EHB, ML! according to SJB). Lul Pålkem, June 1941 (WRN!).

Doubtful: Ång Tåsjö (CDG, E.T. 1931, p. 164; the CDG collection includes only *versutum* and *dolens* from Tåsjö!). "Lapponia, per partem infimam" (ZTT 1840, p. 41); "Lapp. Torn." (leg. ?, coll. GLL!).

*Norway*: Widely distributed and frequent in the south and southeast. West right into the Stavanger region, frequent (several localities; HLS 1915, p. 24), north as far as 13 Fron and Lalm. Then near 20 Romsdal, Veblungsnes (SIE 1875, p. 101) and finally four localities in Trondheim region: 27 Trondheim; 28 Inderøy; Steinkjer; Snåsa (N.E.T. 1923, p. 276; 1937, p. 147). The gap between Stavanger and Romsdal might be real, since the montane region has been comparatively well surveyed.

*Finland*: Widely and rather uniformly distributed. Actual gaps do not seem to exist in the southern half, but the northernmost localities are rather isolated: Lk Muonio (SBJ 1873, p. 120); Ob Rovaniemi (SAA!); Ks Kuusamo (MKL, MH!), Paanajärvi (KRG, according to PFF 1943, p. 122).

Erroneous: NI Tvärminne, sea drift (Frey 1937; STÅ 1938; = *moestum* and *versutum*!).

*Russian sector*: Only in southern Karelia, northernmost near Kc Segosero (SBJ, MH!).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and frequent (West 1940, p. 45). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 367), also Ireland (JHS and HLB 1902, p. 579).

*Total area:* Palearctic species. In Europe, south as far as northern Spain (FUE 1920, p. 199), southern Italy and Sardinia (LUI 1929, p. 134), Bulgaria (APF 1904, p. 292). The Caucasus (CHD 1846, p. 135; SDR and LDR 1878, p. 69). Siberia (among others, SBJ 1880, p. 38; RM!), east as far as Lena (PPP 1906b, p. 36).

### Ecology

98 An extremely eurytopic riparian species. Found on all types of stagnant and flowing water bodies as well as brackish water. On loamy, loamy-muddy, loamy-sandy, and gravelly and stony localities as long as mud is also present; also found on peat soil. Less often on gyttja,<sup>†</sup> as this insect generally decreases at eutrophic lakes in comparison with other *Agonum* species (*moestum*, *versutum*, *thoreyi*, etc.). Along obligotrophic and dystrophic lakes with stony banks; often representing (in addition to *Bembidion doris* and *rupestre*, *Pterostichus nigrata* and *diligens*) the only carabid. Prefers open shores exposed to the sun, but also tolerates moderate shade. The most essential requirement is the presence of vegetation, especially *Carex*, even if quite sparse; whether the soil is overgrown with moss or not seems immaterial. Markedly hygrophilous, remaining in the immediate vicinity of water. "In northern Germany this species strictly avoids marshy soil" (ROU 1934, p. 74). According to Dahl (1928, p. 101) the species likes humic acids, which I rather doubt.

### Biology

Southern Swedish catches: II: 2; III: 3; IV: 9; V: 70; VI: 144; VII: 57; VIII: 29; IX: 12; X: 3; XI: 1. Immature beetles in large numbers (in Ögl) between July 6 and August 18; in Denmark yet until September. Larvae found in Denmark from July until September (LRS 1939, p. 330). Copulation observed on July 3, 1944 (Boh, LTH). Breeds in spring, hibernating as an adult.

### Dynamics

Wings fully developed. However, used comparatively rarely since only a single observation of spontaneous flight is available—Små Gårdsby, May 21, 1943, male (BRD!)—and my several attempts to induce flight upon exposure to sunlight were not successful. It should also be mentioned that specimens from Finnish sea-drift material mentioned as *viduum* (Frey 1937; STÅ 1938) were wrongly identified (see above).

<sup>†</sup>(cf. page 69; suppl. scient. edit.).

## Variation

Black or bluish specimens found singly but regularly among normal individuals. These are always old, posthibernation specimens that have lost their bright metallic sheen apparently under the influence of external factors.

## Fossil Records

Skåne, late glacial (HNR 1933, p. 131). Finland, Ik, postglacial (PPP 1911, p. 39). Galicia, glacial (SCL 1916, p. 50).

99

\**Amara* (s. str.) *aenea* De G.  
(*trivialis* Gyll.)

## Distribution

*Sweden*: In the south distribution probably uninterrupted right into the central Swedish lake region, but scarcer in the inland. Especially frequent along the southwestern coast, as well as on Öld and Gtl. The gap on the east coast (Ögl, northern Små) is definitely not real. Northernmost localities: Dsl Bengtfors (LTH); Vrm Alster (ZRN!); Lundsberg (WRN!); Dlr Stora Tuna, 1 specimen (KLF!); Hedemora, 1 specimen (RGS, E.T. 1913, P. 232!); Upl Forsmark, 1 specimen (LTH); Hls Iggesund, July 3, 1936, 1 specimen (LTH).

*Norway*: Only in the south and southeast, but here widely distributed. Along the southern coast west as far as 6 Jæren (rare, HLS 1915, p. 28; MST 1927a, p. 293; MO!). Northernmost localities: 15 Kongsberg (MST l.c.); 2 Ringerike; 12 Gran; 13 Neverfjell. Apparently no gaps existing.

*Finland*: Distribution continuous in the south and southeast. Northernmost locality: Ok Kajana (CRP!). Otherwise the northern boundary extends as a continuous oblique line through the following localities: Tb Keuru (PHJ!); Laukaa (EHN, MÅ!); Sb Kuopio (ENW, MH!); Nilsiä (LEV, MH!); Kb Polvijärvi (PHJ!).

*Russian sector*: In southernmost Karelia several localities (several collectors!), north as far as Kn Semsjarvi (CRP!). One isolated locality on the White Sea: Kr Suma (EDG, MH!).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and very frequent (West 1940, p. 34). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (ULN 1884; BRM 1930). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 362), also Ireland (JHS and HLB 1902, p. 575).

*Total area*: Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 152), Corsica (DEV 1935, p. 46), southern Italy, including Sardinia, Sicily, Malta (LUI 1929, p. 107), Greece and Crete (OTZ 1886, p. 210). Northern Africa (BED 1895–1914, p. 171). Canary Islands, Madeira, Azores (JEA 1941–1942, p. 919). Near East (“Vorderasien”) (ECH 1922, p. 34; BOD

1927c, p. 31; CKI 1927–1933, p. 408). The Caucasus (CHD 1846, p. 159; SDR and LDR 1878, p. 72). Turkmenia and Afghanistan (HEY 1896, p. 15). Himalaya (JEA 1.c.). Western Siberia (among others, SBJ 1880, p. 36).

100

### Ecology

Markedly xerophilous and heliophilous species. On completely open ground with closed but generally sparse and principally very short vegetation, mainly grasses, crucifers, *Rumex acetosella*, *Thymus serpyllum*, and so forth. Especially prefers sandy soil, but (unlike *Spretia*), not on loose quicksand; on the other hand also found on gravelly soil and frequent, for example, in the “Alvar”† of Öld, and even occurs on dry hard clay. Often frequent on cultivated soils, even in the city. The decisive factor seems to be sufficient solar warmth; the species tolerates some shade, however. Singly and perhaps only coincidentally found on medium moist soil.

### Biology

Swedish catches: III: 3; IV: 23; V: 64; VI: 87; VII: 47; VIII: 32; IX: 13; X: 2. Numerous immature beetles between July 18 (Dsl) and September 1 (Öld); larvae and pupae end of July (WGR 1915, p. 83), in Denmark from beginning of July to beginning of September (LRS 1939, p. 336). Spring breeder, hibernating as an adult. The beetle is omnivorous and has been observed feeding on *Capsella* pods as well as on mosquitoes (S.E.Z. 1876, p. 401). NOT (1943, p. 36) saw specimens feeding on larvae of *Contarinia leguminicola* and *Phytomyza*. Larvae said to be mainly carnivorous, but simultaneously will attack “grain” (= “Getreide”) (BLK 1925, p. 27), a statement questioned by NOT (l.c.).

### Dynamics

Wings fully developed. Observations on flight available to date only from Central Europe (JNN 1905, p. 11; GRD 1937, p. 76; JEA 1941–1942, p. 919; HOR and NBG in litt.). Six specimens in sea drift from Finland (STÅ 1938, p. 19; PME 1944, p. 38).

### Fossil Record

Galicja, glacial (SCL 1916, p. 50).

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



\**Amara (Cyrtanotus) alpina* Fbr.

(*cognata* Putz., *caligata* Putz., *subsulcata* J. Sahlb.; see MST 1927a, p. 302)

Distribution

(map in LTH 1935b, p. 590)

101 *Sweden*: A very distinct fjeld† species. Southernmost record yet lies far below coniferous forest timber line, but is certainly coincidental: Dlr Floda, June 1919, 1 specimen (TJB, E.R. 1928, p. 25!). The otherwise uninterrupted distribution along the fjeld chain shows a gap in central Jtl, which could be real: in northern Jtl only 1 specimen near Jorm, Mesklumpen (JNS and Palm, E.T. 1936, p. 184); on the other hand, widely distributed in the higher mountain ranges of southern Jtl, north as far as Medstugan (1 specimen, KHK). Easternmost localities: Dlr Fulufjäll, Tandån, July 18, 1918, 1 specimen (FRL!); Städjan, July 1907 (ROS, 1 specimen, ML!). Hjd Vemdalen, Oxsjövålen, several specimens (LBL, RM! CDG). Jtl Hallen, Drommen (1 specimen, FHL!). Äsl Satsfjället, 2 specimens (HEQ!). Lyl Tärna, three localities (BOH 1857, p. 23; KLF! Holm!); Sorsele, two localities (GTZ, E.T. 1932, p. 51!). Pil Svaipa, numerous specimens (SWB, coll. Palm!); Sulitälma region, frequent (LTH 1935a, p. 41). Lul Gällivare (GTZ!); Harrå (Holm!). Tol Vittangi (ZTT 1828, p. 29), July 29, 1938, 1 specimen (LTH); Karesuando (BRC, RM!).

Erroneous: Göteborg (EKB, MG!).

*Norway*: In the fjelds of the central southern part widely distributed and generally frequent. Southeast as far as 22 Sandhaug in Hardangervidda (N.E.T. 1937, p. 24); Finse (KLF!); Hallingskarvet (STE, MB!); 14 Synnfjellet in Torpa; 11 Femundsenden, *reg. silv.*, several specimens (Palm and LTH 1937, p. 119!). Then in the north, from 30 Hattfjelldal (STE, MO!) and 32 Salten (SPS 1888–1889, p. 110) as far as southern Varanger, but only from 36 Skibotn (LBÅ!) onwards on the coast as well. The gap between about 63° and 65½° is almost covered by localities in Sweden.

*Finland*: Only in the fjeld regions of the high north. Southernmost localities: Le Ounastunturi (RNK; LGB, coll. STK); Lp Juovotunturi (LTV); Saariselkä (PFF, N.E. 1942, p. 66); Ks Salla, two localities (KNG! RTV! STK).

*Russian sector*: Only on the Kola Peninsula, along the coast as well as in the inland. South as far as Lm Kantalaks (PPP 1905, p. 95; MH!); otherwise on the southern coast only near Lj Pjalitsa (PPP l.c.; MÅ!).

*Adjacent regions*: No records from Denmark, the Baltic States, Leningrad region, or throughout Central Europe. British Isles, only Scotland (LTH 1935b, p. 590).

*Total area*: Palearctic species. In Europe, Boreo-British; outside the region partly in Scotland and partly in northern Russia: Kanin (PPP 1909, p. 7); Pechora (PPP 1907c, p. 309); Kolgujev, Waigatsch and Novaya Zemlya (PPP 1910a, p. 320). Siberia, in the tundra, east as far as Bering Strait (see LTH l.c.).

†(cf. p. 48; suppl. scient. edit.).

## Ecology

Definitely on alpine species, which up to now appeared spontaneously and in comparatively large numbers at just one locality: 11 Femundsenden in the *reg. silv.*, on sandy *Empetrum-Pinus* heath. Still in the *reg. bet.* the species is rare and highly local (for example, BRD 1934, p. 232); it is at home only in clearings and open fields featuring an alpine dwarf-shrub heath. The timber line as the lower dispersal limit for the species is also evident in Norway (SPS 1910a, p. 77; MST 1927a, p. 305; N.E.T. 1932, p. 27) and Finland (LBÅ 1927, p. 19). Isolated occurrences in regions of coniferous forests have been reported only by PPP (1905, p. 17). In the *reg. alp.* of the region *alpina* it is one of the most frequent beetles. It prefers not-too-dry dwarf-shrub heaths with *Empetrum*, *Betula nana*, *Arctostaphylus alpina*, etc. (see for example, LBÅ, l.c.; 1933, p. 114; BRD l.c., pp. 71 ff.; LTH 1935a, p. 12); on the other hand, frequent on grassy heaths and at least in the Abisko region in *Trollius* meadows (BRD l.c., pp. 84, 89). Missing on marshy soil. In the boulder fields† (“Blockmeere”) of the high alpine region, where there are only patches of scant vegetation of *Salix herbacea*, often with *Cassiope hypnoides*, *Luzula arcuata*, *Ranunculus glacialis*, and others, this species occurs more regularly and ranges higher up than any other beetle (< 1,650 m above sea level; BRD l.c., p. 103). In Siberia a characteristic animal of the tundra (PPP 1910a, p. 320; 1910b, p. 8).

## Biology

Adults occur throughout the short fjeld summer, but maximum abundance clearly in mid-July; large numbers of dead specimens are found thereafter. Copulation was observed on July 10, 1939 (Tol). Immature beetles, (one specimen each) found on August 3, 1925 (Pil) and August 28, 1939 (Lul). That the adult hibernates is indisputable; however, it is still uncertain whether development is completed within one summer, or if the half-grown larvae hibernate together with the adults as well. Cannibalism has been observed (Tol Abisko, July 1939, KRG).

## Dynamics

Wings fully developed and undoubtedly functional, but no corroborative observations to my knowledge.

## Variation

Within the region, a more or less distinct dominance of rufous specimens;

†(cf. page 48; suppl. scient. edit.).

- 103 about 80% in the Swedish Sulitalma region (LTH 1935a, p. 41), and 85% in Le Kilpisjärvi region (LBÅ 1927, p. 19). PPP (1909, p. 7), based on his observations on the Kanin Peninsula, maintains that metallic and rufous individuals live in separate biotopes. Neither LBÅ (l.c.) nor I have been able to confirm this statement. The rufinism in this case, as in other alpine Coleoptera, has to be considered a climate-induced modification. For data on the considerable variation in gestalt, body size, etc., see MST (1927a, pp. 302ff.). None of these forms seems to inhabit a restricted geographic area within the region.

### Fossil Records

Skåne and Denmark, northern Jylland, late glacial (HNR 1933, p. 140).

*\*Amara (Bradytus) apricaria* Payk.

### Distribution

*Sweden:* Continuously distributed throughout the country, usually frequent, and extends even into the valleys of the fjeld region. Highest localities: Hjd Funäsdalen, 1 specimen (BRK!). Jtl Stalltjärnsstugan and Åre, 1840 (ZTT, ML!); Ånn, 5 specimens (LTH). Lyl Ammarnäs (GTZ, E.T. 1932, p. 52!). Lul Kwickjock (several collectors!); Sarek (JNS 1926, p. 909), Aktse, 1 specimen (LTH); Saltoluokta, 1 specimen (LTH). Tol Kebnekaise, accidental find on glacier, 1 specimen, July 12, 1941 (BGW!); Abisko region, frequent (several collectors!); Karesuando, Kummavuopio, several specimens (BRC, RM!).

*Norway:* Uniformly distributed throughout the country except the high fjelds and the northernmost peninsula. Northernmost localities: 37 Hammerfest (MST, STA); 38 Kistrand in Porsanger (SHY, MO!). Apparently no gaps in distribution.

*Finland:* Distributed throughout the country, as far as Fischer Peninsula in Petsamo (HLL! KRV!). The insignificant gaps on the map are certainly fictitious.

*Russian sector:* In the western and southern parts of the Kola Peninsula, according to PPP (1905, p. 95; no voucher specimen) also near Lj Ponoj in the east; in any case missing on the north coast east of Kola city. In Karelia, north near Kk Soukelo (PPP l.c.; MH!) and Kc Vuonninen (HDL), as well as in the south (numerous localities and collectors!).

- 104 *Adjacent regions:* In Denmark, including Bornholm, everywhere (West 1940, p. 36). Estonia, including Ösel (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 362), also Ireland (JHS and HLB 1902, p. 573). Shetland (West 1930, p. 75).

*Total area:* Circumpolar species. In Europe south as far as southern Spain (FUE 1920, p. 158), southern Italy including Sicily (LUI 1929, p. 110), Greece (OTZ 1886, p. 210). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP



1907c, p. 309). Near East (BOD 1927a, p. 36; 1927c, p. 50). The Caucasus (CHD 1846, p. 160; SDR and LDR 1878, p. 74). Kirgizia, Turkmenia, western Turkestan (HEY 1880–1881, p. 40). Siberia (among others, SBJ 1880, p. 34; RM!), east as far as Lena (PPP 1906b, p. 49) and Amur (HEY 1893, p. 22; BOD 1927b, p. 57). Northern Mongolia (JEN, MO!). North America (Leng 1920, p. 60).

### Ecology

Always on open, rather dry to very dry, mostly unshaded soil, with more or less closed but not very tall vegetation. Prefers sandy or gravelly soil, but also found on loamy, humus, or peat soil, and hence considered a definitely eurytopic species. Shows strong preference for cultivated soil; markedly synanthropic, especially in the northern parts of the region and found under planks, stacks of weeds, cereal wastes, etc. on farms, but also throughout fallow lands, refuse dumps, along paths and railway lines, and other such places. In the fjelds already scarcer in the upper part of the coniferous forest region. In the *reg. bet.* found on the Kola Peninsula (PPP 1905, p. 95), near Lul Salto (LTH), and regularly in the Abisko region (BRD 1934, p. 231; LTH). In the *reg. alp.* spontaneously only at Lj Ponoj (PPP l.c.; 1910a, p. 319); once found coincidentally on a glacier in Tol (see below). In Central Europe mainly on light soil as well (West 1940, p. 36; Dahl 1928, p. 133; GRD 1937, p. 46).

### Biology

Southern Swedish catches: II: 1; III: 3; IV: 14; V: 35; VI: 60; VII: 55; VIII: 66; IX: 19; X: 3; XI: 1. The maximum abundance in August is still more pronounced in Denmark (LRS 1939, p. 338). Immature beetles found mainly in July, in southern Sweden from June 11 (Vgl) to July 16 (Små), and in the north still until August 14 (Lul); in addition one single specimen was detected on April 14, 1933 (Ögl Motala). In Denmark larvae partly in end of May (1 specimen) partly in September and October. The species undoubtedly breeds, as assumed by LRS (l.c., p. 410), in autumn and hibernates usually in the larval stage; nevertheless the number of hibernating adults is not small, which probably breed only during the following spring.

### Dynamics

Wings fully developed and flight capacity good. For the rest of Europe there are numerous records of this species captured at light, and even en masse flight (LNZ 1857, p. 15; E.M.M. 1930, pp. 232, 233, 257; LSH 1936, p. 141). In this connection I am aware of only a single observation from Fennoscandia: Ble Rödeby, August 12, 1942 (SDH!). However, there are other almost equally



good pieces of evidence: Stockholm, dead specimen in the glass of an overhead light, 1943 (FRL!); Tol Kebnekaise, 1,700 m above sea level, on a glacier, July 12, 1941, 1 specimen (BGW!); Nl Tvärminne, numerous specimens in sea drift (Frey 1937, p. 437; STÅ 1938, p. 20; PME 1944, p. 38). Thus the capability of dispersal of this species is very good.

### Fossil Record

Galicja, glacial (SCL 1916, p. 50).

*\*Amara (Cyrtonotus) aulica* Panz.  
(*spinipes* Schio.)

### Distribution

*Sweden:* Continuously distributed from Skå to Jtl, but strangely enough not recorded to date in large parts of Vrm and Vst. Rare in Vbt and northern Ång, indicating the possibility of a gap here. In Nbt again found more often, which cannot be exclusively the result of more thorough investigation. Northernmost localities: Nbt Pajala, in the "Kirchdorf" and near Erkheikki; Tärendö; all in 1938 (LTH). Only in Hjd and Jtl ranging into the true fjeld region; highest (in placement) localities: Dlr Särna (AND, LF); Hjd Tännäs (frequent) and Ljungdalen, 1936 (BRK); Jtl Ånn, 1934 (LTH); Snasen, 1914 (RNG, coll. BRD!); Jorm, two localities, 1932 (JNS and Palm, E.T. 1936, p. 184!); Åsl Stalon, 1936 (LTH); Lyl Tärnaby, 1939 (LDV!); Sorsele, 1911, 1928 (GTZ, E.T. 1932, p. 51); Pil Arvidsjaur, 1937 (RGS!); Lul Jockmock, 1924 (LTH); Gällivare, 1941 (KMN, ML!); Ullatti 1938 (LTH). It is noteworthy that the species is missing from Norrland in all older collections. Still GLL (1896) designated the distribution as "Skå to Vst."

106 *Norway:* Distribution throughout the southern and central parts, except for fjeld, and north as far as Lofoten. Northernmost localities: 34 Sandøy (SOO, according to STA); Ö-Vågöy (MO!); Bö (MST 1927a, p. 301); Trondenes (MST l.c.); Harstad (SPS 1888–1889, p. 109), all in Lofoten. Northernmost locality on the mainland: 31 Bodö (several collectors!).

*Finland:* Missing only in northern Lapland, otherwise distributed throughout the country. Northernmost localities: Le Enontekis (coll. CRP!); Lk Kitilä (SAA! HLM, coll. NUM); Pelkosenniemi (LTV); Ks Salla (KRG!); Lp Salmijärvi, June 28, 1937, 1 specimen (NDM!); 11 records from the twentieth century.

*Russian sector:* According to PPP (1905, p. 95) near Lm Hibirä on Kola Peninsula (no voucher specimen). Southern Karelia (several localities and collectors!), north as far as Kr Vojatsch (PPP 1899a, p. 13; MH!).

*Adjacent regions:* Widely distributed and frequent in Denmark, including Bornholm (West 1940, p. 36). Estonia (HAB, in litt.); Latvia (SDL 1872; also

others). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 363), and Ireland (JHS and HLB 1902, p. 573). Shetland and Faeroe Islands (West 1930, pp. 19, 75).

*Total area.* Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 159), central Italy (LUI 1929, p. 111), Greece (APF 1904, p. 307). Northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 309). The Caucasus (CHD 1846, p. 162; SDR and LDR 1878, p. 74). Western Turkestan (HEY 1880–1881, p. 39). Western Siberia (SBJ 1880, p. 32; RM!<sup>3</sup> PPP 1907d, p. 19).

### Ecology

On open, moderately moist soil of meadows with rich, often tall vegetation, but also (especially in the north) on similar cultivated soil, for example, under stacks of potato greens, and among other vegetables. The nature of the soil seems to be of secondary importance; found on loamy, gravelly, or peat soil, but never on pure sand. The kind of vegetation and especially the abundance of large-headed Compositae (also see below) could be decisive. The true fjeld regions are reached only in the south and the coniferous forest limit is not crossed there. In northern Germany mainly on heavy soil (NBG 1933, p. 53; GRD 1937, p. 46).

107

### Biology

Southern Swedish catches: III: 4; IV: 9; V: 28; VI: 53; VII: 60; VIII: 79; IX: 6; X: 1; XI: 1. The maximum abundance in August and the sudden decline in September is similar in Denmark as well (LRS 1939, p. 338). Immature beetles from June 18 (Vst) to July 20 (Boh), in the north even until August 15, (Nbt); in Denmark, however, only during April and May. Larvae found in Denmark mainly in April, but singly in August and September as well; hence the statement that the species hibernates principally in the larval stage (LRS l.c., p. 410) is certainly correct. However, in our region a somewhat larger number of adults seem to live on until spring in addition; this might even be normal in the north since immature beetles were not observed in Norrland before July 21 (Asl). According to a very large number of observations from all parts of Europe, the species has often been found in the heads of Compositae. In Sweden occurring on *Carduus crispus* (Skå), *Cirsium arvense* (Gtl, Vst), *C. heterophyllum* (Dlr, many times), and also on *Taraxacum* (Hjd, numerous specimens) and *Solidago virgaurea* (Nbt); in Finland on *Centaurea jacea* (NDM 1944, p. 27); in other regions also found on *Cirsium oleraceum* (JNN 1905, p. 194; HOR 1941, p. 270), *C. palustre* (Rapp 1933, p. 107), *Carduus nutans*

<sup>3</sup>PPP's assumption (1906b, p. 52) that only *fodinae* Mnh. occurs in the Yenisey region is erroneous.

(SZM 1907, p. 129), *Achillea millefolium* and *Centaurea nigra* (BLK 1925, p. 29), *Arctium* (West 1940, p. 37), *Leontodon* (BUR 1939, p. 118), *Tussilago* and *Inula* (Rapp l.c.), Umbelliferae (WHF 1881, p. 29), *Fagopyrum* (BUR l.c. and on *Capsella*, feeding on its seeds (GRD 1937, p. 28); in Finland even by hundreds on the inflorescences of *Alopecurus pratensis* (NDM 1944, p. 26). It has been stated that the species feeds on inflorescences (SPS 1875, p. 21) or on unripe seeds (BLK l.c.; purportedly also of cereals, BUR l.c.; I have seen it on *Solidago*). FRL (in litt.) discovered, however, that this species also feeds on the larvae of *Larinus sturnus* Schall (Dlr) in the head of *Cirsium heterophyllum* and, according to NDM (l.c.), in Finland it feeds on the larvae of *Oligotrophus alopecuri* F. Reut., living in the ears of *Alopecurus*. GRD (l.c.) fed this species in captivity with lettuce seeds as well as with larvae of *Corymbites*; it also feeds readily on bread (Boh, LTH).

### Dynamics

Wings fully developed, but apparently used only to a limited extent. I am aware of only one flight observation, from Austria (*Mitt. Ent. Ces. München* 30, 1940, p. 800).

108

### Fossil Records

Bavaria, glacial (FLH 1884, p. 6). Belgium, interglacial (LAP 1902, p. 552; 1903, p. 229). Galicia, glacial (SCL 1916, p. 50).

*\*Amara (Celia) bifrons* Gyll.  
(*livida* Fbr.)

### Distribution

(map in BCH 1938, no. 31)

*Sweden*: In southern and central Sweden frequent and continuously distributed at least as far as Mdp and Jtl (not recorded to date from Hjd). Absent in the true fjeld region, but occurs in the coastal region as far as the Finnish border. Northernmost localities: Jtl Jorm, 1932, 1 specimen (JNS and Palm, E.T. 1936, p. 184!); Ång Hoting, 1936, (LTH); Åsl Åsele, 1936 (LTH); Vilhelmina, 1936 (LTH); Lyl Storuman, 1936, 1 specimen (LTH); Rusksele, 1943, 1 specimen (HEQ!). In Nbt six localities (1930–1939), the two northernmost are: Neder-Kalix (LTH and Palm 1934, p. 40!); Haparanda (KMN, ML!). In older collections the species is represented only from north as far as Hls (STH, ML! MU!); GLL 1896 has mentioned "Sk.—Dlr."

*Norway*: Not recorded to date from the coast between 8 Sogn and the Trondheim region; otherwise widely and rather uniformly distributed north approximately as far as latitude 64° N. Farther north, the following localities: 31



Bodö, June 1925 (LTH); 34, five localities in Lofoten, north as far as Andenes (SOO, according to STA); and 35 Tranöy near Senjen (MST 1927a, p. 298).

*Finland:* Frequent and widely distributed in the south. Northernmost localities: Om Gamla-Karleby (HSR, MH!); Haapavesi (HEL, NL); Ok Säräisniemi (WUO 1910, p. 64); Kajana (CRP!). In addition, adjacent to the Swedish area, near Ob Torneå (STN!). It is not certain whether southeast from there a real distribution gap exists.

*Russian sector:* Only in the south, four localities, north as far as Kn Semsjärvi, 1942 (CRP!).

*Adjacent regions:* In Denmark, including Bornholm, widely distributed and frequent (West 1940, p. 36). Estonia, including Ösel (HAB in litt.; Palm!); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360), also Ireland (JHS and HLB 1902, p. 574). Shetland (West 1940, p. 75).

*Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 155), central Italy (LUI 1929, p. 109), Bulgaria (APF 1904, p. 302). The Caucasus (CHD 1846, p. 158; SDR and LDR 1878, p. 73). Western Turkestan and Kirgizia (HEY 1896, p. 16).

109

## Ecology

A definitely xerophilous species, which lives together with *fulva* on very dry, sandy fields, always fully exposed to the sun, with sparse or withered vegetation. Also found on pure sand or on predominantly sand-mixed soil, less often on gravel. Often buried in the soil surface; under especially dry atmospheric conditions congregates under leaf rosettes of thistles, Boraginaceae, *Scabiosa arvensis*, and others. Its predilection for sand has also been noted in Norway (HLS 1915, p. 29; MST 1927a, p. 298), Finland (SBJ 1873, p. 107), and the rest of Europe (see West 1940, p. 36; RTT 1908, p. 164; E.M.M. 1915, p. 6).

## Biology

A distinct midsummer species. Southern Swedish catches: V: 15; VI: 64; VII: 78; VIII: 51; IX: 9; X: 2. The maximum abundance in July is even more pronounced in Denmark (LRS 1939, p. 337). Immature beetles were found in large numbers in June, from May 30 (Ögl) to July 9 (Dlr) and July 10 (Nbt). Hibernation occurs without doubt exclusively in the larval stage. According to Rapp (1933, p. 104) observed in Germany on ears of cereal.

## Dynamics

Wings fully developed and the species undoubtedly with flight capacity. However, there are no flight observations. The only indication is the record of several specimens in sea drift in Finland (Frey 1937, p. 437; PME 1944, p. 38)



and the occurrence "in gas tanks" in Elberfeld (CRN 1884, p. 11; see p. 15 above). The beetle is an extremely fast runner.

*\*Amara (Celia, Acrodon) brunnea* Gyll.

Distribution

*Sweden:* Found in all provinces, and quite uniformly distributed in the southern half of the country. Also widely distributed in the alpine and subalpine regions of the north, where it is often rather frequent; contrarily, very rare in the coastal regions of the Gulf of Bothnia: In Nbt three localities on the Finnish border; Vbt Jörn, 1 specimen (LTH); Degerfors, 2 specimens (FRL!); Ång  
110 (leg. ?, 1 specimen, SH!); Mdp Erikslund, 1 specimen (Holm, coll. LTH); Hls Los (SJB); Delsbo (RUD, ML!); Gst Hamrånge, 1 specimen (LTH).

*Norway:* In southern Norway predominantly a fjeld species, but in the extreme south and Oslo region also found on the coast, west as far as 6 Jæren (HLS 1915, p. 29). On the westland, only near 20 Andalsnes, 1934 (MST). Strikingly, there is only one locality in the Trondheim region (Trondheim, LYS, 3 specimens, MD, as *praeternissa*!). Farther north, from 30 Klovimoen and Hattfjelldal (STE, MO!) as far as southern Varanger widely distributed and often frequent; on the coast as well as in the inland, only on the northernmost peninsula apparently absent. Northernmost localities: 38 Kistrand in Porsanger (SHY, according to STA); 40 Tana (MST).

*Finland:* In the south as well as in the extreme north (especially in the Petsamo region) widely distributed and often frequent. Contrarily, in the intervening regions (about latitude 63° to 68° N) rare and occurring very sporadically, for example, on the coast hitherto not found between Oa Vasa (MNH, MH!) and Ob Uleåborg (WUO, MH!); a considerable gap also in the inland between latitude 66° and 68° N, where the species occurs very rarely.

*Russian sector:* On the Kola Peninsula numerous localities in the west as well as at the sea, even on the northern coast: Lj Lumboffski (PPP 1905, p. 96; MH!), east as far as Lj Ponoj (PPP l.c.; MH!). In Karelia partly in the north, south as far as Kc Vuonninen (HDL) and Solovetsk Island (EDG, MÅ!), partly at several localities in the south (several collectors!), and north as far as Kn Juustjärvi (PPP 1899a, p. 97; MH!).

*Adjacent regions:* In Denmark rare, but occurs in Jylland as well as on the islands, including Bornholm and Læsø (West 1940, p. 36). Estonia (HAB in litt.); Latvia (MIK 1905, LCK and MIK 1939). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area:* Circumpolar species. In Europe (montane regions south as far as northern Spain (FUE 1920, p. 155), northern Italy (LUI 1929, p. 110), Transylvania (PTI 1912, p. 30). Northeast as far as Pechora (PPP 1907c, p. 309). Siberia (among others, MKL 1881, p. 21; WUO, MH!), east as far as Lena (PPP 1906b, p. 49). North America (Leng 1920, p. 60).

## Ecology

Of all species of *Amara*, this species has the least requirement for light. In the south an almost stenotopic deciduous forest species, which lives in open  
 111 groves on fairly dry soil, with little or no ground cover ("Feldschicht"), above all under birch foliage; also under *Hylocomium* and other mosses, as well as under bark. Prefers gravelly (moraine) soil, preferably with an admixture of sand or loam, even on quite coarse rubble, for instance on moss-covered scattered blocks of stone. In Skå repeatedly found in birch forests. In the fjelds, especially in the *reg. bet.*, often numerous, but ranges as far as the lower *reg. alp.* (in Sweden up to 800 to 1,000 m above sea level; BRD 1934, p. 231; JNS 1926, pp. 900, 909; GTZ, E.T. 1932, p. 52; accidentally found still higher, see below) and even to the tundra of the Kola Peninsula (PPP 1910a, p. 319), where it lives particularly under *Empetrum*. Correspondingly found in southern Sweden, singly under *Calluna*, for example on dry marshy soil, an occurrence which seems to be more frequent in Central Europe (LRS 1939, p. 409; E.B. 1911, p. 19; GRD 1937, p. 46; HOR 1941, p. 268). Otherwise its preference for deciduous trees, especially birch, has been corroborated from all parts of its range of distribution: Norway (SPS 1910a, p. 77; STA in litt.); Finland (PPP 1905, p. 96); Denmark (SDT 1870, p. 403; HSN, F.F. 1925, p. 47; West 1940, p. 36). Central Europe (LTZ 1885–1892, p. 31; NBG 1933, p. 55); Siberia (PPP 1960b, p. 49).

## Biology

Southern Swedish catches: II: 1; III: 1; IV: 5; V: 32; VI: 83; VII: 29; VIII: 26; IX: 8; X: 2; XI: 1; XII: 1. Numerous immature beetles in southern Sweden between June 21 (Små) and July 22 (Sdm); in the north later, even on August 23, 1939 numerous (Lul Salto). It would therefore be useful to investigate whether, at least in the fjelds, hibernation takes place normally in the adult stage. In other respects the information by LRS (1939, pp. 337, 408) from Denmark might hold true, according to which the species normally breeds in autumn and hibernates in the larval stage, although besides a large number of beetles survive until spring.

## Dynamics

Wings fully developed, but flight observations have not been reported. I conducted experiments with exposure to sun and warmth, but to no avail. However, the following records might provide proof of flight capacity: Ögl Alvastra, Vättern shore in drift material, May 30, 1932, 4 specimens (Palm); 2 specimens in sea drift, Finland (STÅ 1938, p. 19; PME 1944, p. 38); Tol Kebnekaise, July

12, 1941, 9 specimens on glaciers at a height of 1,300 to 1,700 m above sea level (BGW!).

112

\**Amara* (s. str.) *communis* Panz.

(including *convexior* Steph. auct., *continua* Thoms.)

#### Distribution

**Sweden:** Very frequent and found throughout south and central Sweden. Becomes scarcer north of Ång, and does not reach the true fjeld region, but distributed north of the Gulf of Bothnia almost as far as the Polar Circle. Highest or northernmost localities are: Dlr Idre (AND, LF!); Hjd Bruksvallarna (CDG!); Tännålen (BRK!); Jtl Ånn (LTH); Åre (ZTT, ML! BGW!); Undersåker, Hottön (BRD!); Jorm, several localities (JNS and Palm, E.T. 1936, p. 184!); Åsl Bångnäs (Runquist, ML!); Nästansjö (ZTT 1840, p. 34, "*similatus*"; ML!); Vilhelmina (LTH); Lyl Sorsele and Vallnäs (GTZ, E.T. 1932, p. 53!); Lul Pållem, 1942, 2 specimens (WRN!); Nbt Harads and Bodträskfors, 1938, 6 specimens (LTH); Över-Kalix, 1 specimen (AGR!).

Doubtful: According to a manuscript by BOH (K.V. Ak.), collected by him near Lul Jockmock and Nelkerim, June 1843 (no voucher specimen).

**Norway:** South of the Polar Circle possibly widely distributed except in the true fjeld regions. The distribution gaps in the map, especially on the west coast, are no doubt due to insufficient investigation. Farther north in the following localities: 32 Saltdal, two localities (SPS 1888–1889, p. 114); 31 Bodö (several collectors!); 32 Lofoten, three localities (MST 1927a, p. 290); 36 Målselv, two localities (STA); 35 Tromsø (SPS, according to STA).

**Finland:** South of about latitude 65° N widely and possibly continuously distributed; gap on the southern coast may be only apparent. Farther north only sporadic and rare: Ob Kemi (EHN, MA!); Lk Muonio (SBJ 1873, p. 113); Kittilä (SAD, MH! KRG!); Sodankylä (SUD, MH!); Ks Kuusamo (MKL, MH!); Paanajärvi (PFF!); Lp Lutto, Rajakoski (PFF, N.E. 1942, p. 66!).

**Russian sector:** On the southern border of the Kola Peninsula two localities: Lm Kantalaks (PPP 1905, p. 97; MH!); Fedosersk (PPP l.c.); farther near Kc Kem (PPP 1899a, p. 15; MH!) on the White Sea. In southern Karelia several localities (several collectors!).

**Adjacent regions:** In Denmark, including Bornholm, widely distributed and frequent (West 1940, p. 33). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 362), also Ireland (JHS and HLB 1902, p. 575).

113

**Total area:** Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 152), central Italy (LUI 1929, p. 106), Greece (OTZ 1886, p. 210). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 309). Asia Minor (according to CKI 1927–1933, p. 411). The Caucasus (SDR and LDR 1878, p. 72; ECH 1930a, p. 146). Western Turkestan (HEY 1896,



p. 15). Siberia (among others, SBJ 1880, p. 36; RM! WUO, MH! JEN, MO!), east as far as Lena (PPP 1906b, p. 47), Ussuri (MDL 1931, p. 5), Kamchatka (BNN, NET, SBR 1929, p. 4; WUO, MH!).

### Ecology

A most eurytopic species. Preferably mesophilous, but also lives in completely dry places together with *aenea* and, contrarily, also found on fairly moist soil. It tolerates shade better than most other species of *Amara* and frequently occurs together with *brunnea*, for instance in foliage under bushes and trees. Soil conditions are of less importance: found on loam, peat, and humus as well as on sandy and gravelly soil with some admixture of loam. Predominantly a meadow species, occurring in very large numbers under moss-covered blocks of stone lying in the open. Also on fallow land and various kinds of cultivated soil covered with grass, e.g., frequently in barns under hay. Higher up, does not reach the *reg. bet.*

### Biology

Southern Swedish catches: I: 1; II: 0; III: 6; IV: 60; V: 144; VI: 145; VII: 32; VIII: 21; IX: 13; X: 5; XI: 0; XII: 1. Definitely a spring insect. Immature beetles in southern Sweden between July 22 (Upl) and August 16 (Vgl); strangely in part earlier in the north: July 11 (Vbt), July 20 (Åsl). Larval hibernation could be possible, which is also indicated by the discovery of a larva toward the end of May in Denmark (LRS 1939, p. 335). Normally, however, undoubtedly breeds in spring and hibernates as an adult, as noted by LRS (l.c., p. 405). In captivity the beetle was feeding on fresh specimens of *Lumbricus* (LTH).

### Dynamics

Wings fully developed, but may be used comparatively very little. Flight has only been observed once: Vrm Lundsberg, June 3, 1941 (WRN!). My experiments with exposure to the sun proved futile. Numerous individuals have been found in sea drift in Finland (PME 1944, p. 38).

### Systematics

In an earlier paper (LTH 1943a, p. 40) I explained why *convexior* auct. (*continua* Thoms.) could neither be separated from *communis* as a species nor as a subspecies. JEA (1941–1942, pp. 915, 916) has recently defended once again the retention of *convexior* as a separate species, based on the characteristic external shape of the penis. The penis in *convexior* reportedly constricts before the tip and thus curves there asymmetrically to the left. Therefore, I have



made a large number of dry preparations of Scandinavian specimens. Comparison revealed wide variability, from a broad penis attenuating gradually to an acuminate apex, to a distinctly slender type that narrows abruptly before the tip. Larger males have a slender penis, irrespective of the fact that they may or may not share the external features of "*convexior*," and the different types of penis form a continuous series. None of the specimens exhibit the asymmetry described and illustrated by JEA. One must perforce conclude that, at least in Central Europe, *communis* and *convexior* either constitute a single species, or form a continuous series that arose through hybridization of the two species. If in France and elsewhere males have actually been found in which the penis is asymmetrical (as described by JEA), then perhaps they belong to a separate species, possibly the "true" *convexior*. Yet one has the definite impression that JEA did not examine sufficient material and proceeded, as it were, from the postulation that the external shape of the penis should remain constant.

\**Amara (Bradytus) consularis* Dft.

Distribution

*Sweden*: In the south widely distributed as far as northern Upl and southern Dlr, but rather localized in definite regions; for instance, it has not been reported to date from northeastern Små and north of lake Vänér. Farther north rare and sporadic, and conspicuously (with one exception) recorded only from the inland: Dlr Aspeboda (KLF); Sundborn (TJB!). Hls Ljusne, 1936, 2 specimens (LTH); Delsbo (RUD, MG!); Ljusdal, 1941 (SJB). Jtl Bräcke, Mordviken, 1936, 3 specimens (LTH); Ragunda (FRI, 1 specimen VA!); Frösön, 1936, 1 specimen (LTH). Ång Tåsjön, 1939, 1 specimen (BRC, RM!). Vbt Hällnäs, Bodarna, May 23, 1939, 1 specimen (HEQ!).

- 115 *Norway*: In the south, especially in the southeast, rather widely distributed. The outermost regions of the western part of the country are apparently avoided by the species; nevertheless it has been found in 6 Jæren (HLS 1915, p. 30), the inner ends of the Hardanger Fjord near Tyssedal (MO!) and Sogne Fjord near Fortun, and has apparently moved along Gudbrands valley (Lalm; Sörem in Vågå; Lesjaskog) and the Roms valley (Flatmark). Two northernmost localities are on the Trondheim Fjord: Trondheim (MST 1927a, p. 300); 28 Frosta (N.E.T. 1937, p. 147). It is not certain whether they are associated with the distribution area in southern Norway or that in Jämtland.

Erroneous: 32 Saltdal (MST l.c.; the single voucher specimen is *apricaria*; STA in litt.).

*Finland*: Widely distributed and not rare in the southwest and southeast, but apparently with a gap on the southern coast from Helsinki (several collectors!) as far as Ka Viborg (BOM, MÅ!). Becomes scarcer toward the north, and represented by these delimiting localities: Oa Seinäjoki (PHJ!) Ib Viitasaari (LBG); Sb Iisalmi (STK); Ok Kajana (CRP!); Kb Juuka (LBG!).

*Russian sector:* Six localities in southern Karelia (several collectors!), north as far as Kn Semsjärvi, 1942, (CRP!).

*Adjacent regions:* In Denmark, including Bornholm, widely distributed and rather frequent (West 1940, p. 36). Estonia, including Dagö (HAB in litt.); Latvia (SDL 1872; BRM 1930). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360), also Ireland (JHS and HLB 1902, p. 573).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 159), southern Italy (LUI 1929, p. 111), Serbia (APF 1904, p. 305). In the northeast purportedly as far as Pechora (PPP 1907c, p. 309). The Caucasus (SDR and LDR 1878, p. 74). Kirgizia (HEY 1880–1881, p. 40). Western Turkestan (HEY 1893, p. 22). Siberia (among others, SBJ 1880, p. 34; RM! PPP 1907d, p. 19; JEN, MO!), east as far as Amur (HEY 1880–1881; BOD 1927b, p. 78).

### Ecology

Xerophilous sand insect, occurring rarely on coarser material, sand- or loam-sand-gravel. Always in localities exposed to the sun and usually in thoroughly dry places devoid of continuous vegetation cover. Especially on sandy ground  
 116 in the vicinity of the sea and in sand pits; also in sandy fields. Almost always found together with *fulva* and *bifrons*, and frequently gathers, like these species, under leaf rosettes of thistles, *Scabiosa*, and similar plants. Digs into the sand during the day.

### Biology

Southern Swedish catches: III: 2; IV: 12; V: 30; VI: 33; VII: 22; VIII: 29; IX: 3; X: 1. Numerous immature beetles found between June 20 (Hll) and July 17 (Små). In Denmark a larva was found in the beginning of August (LRS 1939, p. 337). The species certainly hibernates normally in the larval stage, but at the same time part of the adults also survive the winter (LRS l.c., p. 410; also see BNN, *Ent. Rundschau*, 27, 1910, p. 80). Whether these also breed during the following spring remains uncertain. According to BUR (1939, p. 119) the larva apparently feeds on *Aphodius* larvae.

### Dynamics

Wings fully developed. As far as I know, flight has been observed only once, in Bavaria (KTT 1873–1874, p. 82), but occurs indisputably at night. In Finland four beetles found in sea drift (PME 1944, p. 39).

*\*Amara (Cyrtonotus) convexiuscula* Mrsh.

Distribution

*Sweden*: Exclusively on the seashore, mainly in the west, but even there not continuously distributed. In western Skå not rare and found in several localities between Trälleborg (MLF, MG!) and Skälderviken (OSS, coll. LTH). Hll Åsa (SJB); Släp, Skalvik (SDN, manuscript). In the Göteborg region found repeatedly and by several collectors (!). Boh Öckerö (NDN); Gåsö (ÅGR!); Uddevalla, July 25, 1933, 6 specimens (LTH). On the southeastern coast: Ble (ANK, VA!), Ronneby July 1, 1908 (CDG!). Små Kalmar (several collectors!). Öld (ERC, MG!). Ottenby, July 1938, 1 specimen (BRC!); Mörbylånga, June 29, 1928, 2 specimens (JNS!). Gtl (WBG, RM!), Hamra (LOH, according to JNS). Quite isolated locality of Upl Runmarö (E. Hahr, according to RGS, E.T. 1913, p. 232; 2 specimens, coll. RGS!).

Erroneous: Ble Tving (E.T. 1926, p. 87, = *aulica*!).

*Norway*: Exclusively in the southeast on both sides of Oslo Fjord, five localities: 1 Hvaler; 2 Drammen, 1917, 1 specimen, 3 Tönsborg and Bastö  
117 near Horton (HLS 1891a, p. 14); Fredriksvaern (MST 1927a, p. 301). Specimen from Drammen found at an altitude of at least 150 m above sea level.

*Finland*: For a long time known only from the Åbo region: Åbo and Run-sala (several collectors! CAJ 1897, p. 48). The report from near Ik Kuokkala, August 7, 1939, 1 specimen, is very surprising (COL, coll. STK!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark, including Bornholm, widely distributed along the coast, but rather rare (West 1940, p. 37). Not known from the Baltic States nor from Leningrad region. British Isles (Joy 1932, p. 363), also Ireland (JHS and HLB 1902, p. 573).

*Total area*: Palearctic species. In Europe found along the Atlantic coast south as far as southern France (DEV 1935, p. 47). In saline places of the inland, e.g., in Germany (HOR 1941, p. 270), Hungary (KTY 1900, p. 36), Transylvania (PTI 1912, p. 30). Central and southern Russia, also on the coast of the Black Sea and the Caspian Sea (JAC 1905–1908, p. 362). The Caucasus (LSH 1936, p. 142). Kirgizia; western and eastern Turkestan; southern Siberia, east as far as Trans-Baikal (HEY 1880–1881, p. 39; 1896, p. 17; JAC l.c.; these old records need to be re-examined).

Ecology

Within the region, a stenotopic coastal species, which lives predominantly among seaweeds, especially on sandy seashores. Also found repeatedly in Göteborg near Lerje on the banks of the Göta River, where no marine water reaches even during high tide or storm tides; near Boh Uddevalla on shell banks, likewise at quite some distance from the seashore. CDG (in litt.) has



also stated that his specimen near Ble Ronneby was not found "along the sea". The species should thus at least be considered halophilous (LNG 1929, p. 61; LBÅ 1931, p. 164; HOR 1941, p. 270), possibly even as halobiont. It may namely be noted that in Central Europe, in addition to the seashore, the species occurs on the one hand in saline inland regions (among others, B.E.Z. 1861, p. 186; 1874, p. 137; LNG 1929, p. 61; Rapp 1933, p. 108; HOR 1941, l.c.), and on the other hand in refuse dumps, e.g., "dumps in the vicinity of the city" (HOR l.c.; JEA 1941-1942, p. 948) or in ballast heaps (FWL 1887, p. 71). HOR (l.c.) mentions in this regard: "It has to be assumed that these habitats contain a certain salt content (perhaps because of household or other  
 118 garbage)". It remains to be determined whether *Amara convexuscula* differs from other halobionts only in a lower requirement for NaCl in the soil, or whether it is dependent on other substances contained in marine water. There might in any case be a chemical dependence.

### Biology

The few Swedish catches can be divided as follows: III: 1; IV: 1; V: 1; VI: 6; VII: 13; VIII: 11. In Denmark numerous larvae have been reported from the end of August to November and during spring from March to April; hence breeds in autumn and hibernates in the larval stage (LRS 1939, pp. 338, 410). According to Rapp (1933, p. 108) the beetle feeds on *Salicornia*.

### Dynamics

Wings fully developed. However, as far as I know, flight has not been observed. An almost definite proof of flight meanwhile is the report of one beetle together with *Harpalus calceatus* near Skå Alnarp, August 23, 1941 (CHR) in a greenhouse, which had a neon light burning at night near an open window.

### *Amara (Bradytus) crenata* Dej.

#### Distribution

*Finland:* From Fennoscandia, as well as all of northern Europe, only a single male is known, which was collected by Håkan Lindberg, August 8, 1941, near Al Kökar, Alby, on a rocky bank (certainly found only accidentally) (N.E. 1941, p. 144!).

*Total area:* Western Palearctic species. In Europe predominantly southern; northernmost localities situated in Thüringen and Hannover (HOR 1941, p. 268); in France north as far as Metz (DEV 1935, p. 47); Slovakia (ROU 1930, p. 169). South as far as northern Spain (FUE 1920, p. 158), central Italy (LUI 1929, p. 110), Dalmatia (APF 1904, p. 304), southern Russia (JAC



1905–1908, p. 361). The Caucasus (CHD 1846, p. 161; SDR and LDR 1878, p. 73). Iran (according to HOR l.c.).

### Ecology

Data from Central Europe completely meaningless: in fields, meadows, paths, river banks, forest fringes, burrowed in soil, etc. (Rapp 1933, p. 105; BUR 1939, p. 120; HOR l.c.). According to HOR (l.c.) a thermophilous species.

119

### Biology

Since mature beetles have been recorded in Thüringen from April to October, and additionally even in January (Rapp l.c.), it may be assumed that the species hibernates at least in part in the adult stage.

### Dynamics

Wings fully developed. In the Caucasus captured at light (CHD 1846, p. 161).

*\*Amara (Celia) cursitans* Zimm.

(*properans* Zimm., *fuscicornis* Zimm., *oculata* Helliesen, 1912  
nomen nudum, *municipalis* Schio. et auct. scand.  
partim nec Dft.)

### Distribution

This species was only recently distinguished from *municipalis*. Hence our present knowledge of the distribution of both species is rather incomplete.

*Sweden*: Skå Hälsingborg, 1887 (LGR, HM!); Vittsjö, 1890 (VNS, ML!). Ble Karlskrona (ANK, VA! THS 1867a, p. 43, "*municipalis*"). Små Kalmar (AHT, VA!). Öld (certainly Halltorp region, MRT, MG!). Gtl Visby, 1928 (LTH). Vgl Göteborg, often numerous (several collectors!); Mölndal (ERC, MG!); Brandstorp, 1939 (BRC, RM!); Kinnekulle (several collectors!) Dsl Högsäter, 1943 (BGW!). Nke Örebro (JNS!). Sdm Torshälla, 1936, (LTH); Östertälje, 1942 (KMK!); Alby, 1941 (LTH); Tungelsta, 1937 (LTH). Stockholm (several collectors!). Upl Uppsala (WRN! WSJ!). Vst Kungsör, numerous specimens, 1936 (LTH). Vrm Fryksta, 1933, 7 specimens (LTH).

*Norway*: 1 Halden (HSS, according to STA). 2, many localities in environs of Oslo (several collectors! HLS 1912, p. 3, "*oculata*"). 5 Lyngdal in Agder (MST, 1 specimen, MO!).

*Finland*: Ab Åbo (SDM, 6 specimens, MH! MER, 2 specimens, MÅ!), May 21, 1901 (G. Sundberg, coll. WLL!). NI Helsinki and Helsing (several collectors; MH! coll. LBG! N.E. 1942, p. 167; S.H.A. 1942, p. 192).

*Russian sector*: No records.

*Adjacent regions*: In Denmark, including Bornholm, rare but widely distributed (West 1940, p. 35). Not known to date from the Baltic States, Leningrad region, or the British Isles.

120 *Total area*: Known only from Europe, south as far as central Spain and the Balearic Islands (FUE 1920, p. 154), northern Italy (LUI 1929, p. 109), Bulgaria (APF 1904, p. 302). East as far as Poland (MAK 1928, p. 292) and Transylvania (PTI 1912, p. 30).

### Ecology

On dry sandy or sandy-gravelly soil, in open situations exposed to sun, and with little continuous vegetation; especially sand pits and gravel pits. Strongly favored by culture, the species is also found along paths, in docks, etc. Occurs particularly under the leaves of large *Rumex*, *Arcium*, and similar plants, and often buried somewhat in the sand. Its preference for sand has also been observed in Central Europe (Fuss, B.E.Z. 1863, p. 435; PLZ 1938, p. 50); also found on the roots of *Festuca* species (PLZ l.c.; KTZ, E.B. 1938, p. 94).

### Biology

Distribution of the few Swedish catches: III: 1 (numerous specimens); IV: 0; V: 4; VI: 10; VII: 3; VIII: 2; IX: 4; X: 3 (numerous specimens). Immature beetles were found in large numbers during June, from June 13 (Sdm) to June 24 (Dsl). It must therefore be assumed, as LRS (1939, p. 408) did for Denmark, that the species hibernates in the larval stage. This is true for a considerable number of mature beetles as well.

### Dynamics

Wings fully developed. Species undoubtedly with flight capacity but to date there is no corroborative data.

### Systematics

The species is very close to *municipalis* (see LTH 1943a, p. 47), and time and again specimens have been found which are externally more or less intermediate. Nevertheless I believe the two species are distinct; differences in the shape of the right paramere (l.c.) have been verified in newly collected Swedish material. The difference in the penis described and illustrated by JEA (1941–1942), is certainly not very striking in our specimens in a dorsal view, but nonetheless may be applicable.

\**Amara* (s. str.) *curta* Dej.  
(*cyanocnemis* Thoms.)

Distribution  
(map in BCH 1938, no. 37)

*Sweden*: In southern and central parts widely distributed, but extremely local and generally rare. The greatest gap occurs in the western inland where precipitation is high (Små, Vgl). In Skå only two localities: Stehag, 1882 (MLC, HM!); Vånga, 1917 (AMM, ML!). Ble Ronneby (WLN, LG!); Nävrögöl (SDH!). Hll Falkenberg (RGS, MG!). Små Kalmar (HGL, coll. JNS!); Klavreström, two times (GTZ!); Nye (GTZ!). Öld Borgholm and Stora-Rör (several collectors!); Ottenby (KHK!). Gtl, several localities and collectors (!). Vgl Floda (ARV!); Vänersborg region (several collectors!). Boh Bullaren (LFF!). In central Sweden somewhat more frequent; west as far as Vgl Gullspång (LTH) and Vrm Fryksta (LTH); north as far as Upl Älvkarleö (LTH, NST!); Dlr Leksand (BLL, coll. ARV!); Hls Ljusne, July 2, 1936, 1 specimen (LTH).

Erroneous: Lapland (THS 1867a, p. 44; 1 specimen, ML!). Norrland (1 specimen, coll. THS, MB!). Probably confused with BOH's record of "*cyanocnemis*" on Trondheim Fjord in Norway.

*Norway*: Predominantly an inland species, whose area forms a narrow belt along the valleys from the southeast toward the northwest; thus it reached, among other places, the inner parts of the Sogne Fjord and Stor Fjord. 1 Hvaler (STE, MB!). 2 Oslo region, several localities (SHY 1879, p. 19; HLS 1891a, p. 15; MST 1927a, p. 292). 3 Holmestrand (HLS l.c.). 4 Kragerö and Nes-Jernverk. 15 Kongsberg and Snarum; Ål (STE, MB!). 19 Årdal; Lærdal; Fortun. 20 Geiranger, 28 Tynes in Verdal (THS 1859, p. 247, "*cyanocnemis*"; also see LTH 1932, p. 277).

*Finland*: Only south of latitude 62° N, but widely distributed except for the western coastal region. Also in Al Jomala (MER, MÅ!), Kökar (STN!), and Hogland Island (FRS, coll. LTH). Northernmost localities: Ta Tammerfors (several collectors!); Pirkkala (GBL! SAR); Padasjoki (EHN, MH! MÅ!); Sa St. Michel (EHN, MH!); Punkaharju (KNG!); Kl Sordavala (LNN, MÅ!); Impilahti (STN!).

*Russian sector*: Only three localities in southern Karelia: Ko Vieljarvi (KNG!); Kn Jalguba (SBJ 1873, p. 110; MH!); Sv Kuujärvi, 1943 (PFF!).

122 *Adjacent regions*: In Denmark rare; found in eastern Jylland (completely missing in the west), and one locality each on Sjælland, Møen, and Bornholm (West 1940, p. 34). In Estonia only three localities, of which one in Ösel (SDL 1872; HAB 1936a and in litt.). Leningrad region (MAS 1903, p. cxv). British Isles (Joy 1932, p. 361), also Ireland (OMH 1929, p. 24).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 152), central Italy (LUI 1929, p. 107), European part of Turkey



(APF 1904, p. 300). The Caucasus (JAC 1905–1908, p. 357). Siberia, east as far as Trans-Baikal (HEY 1880–1881, p. 37).

### Ecology

On dry, sandy-gravelly soil, particularly in moraines with sparse and low vegetation that is often negligible. Always in open places, preferably on slopes facing south. Particularly found along forest fringes or in gravel pits. Occasionally gregarious in small, localized places. Occurs under small stones or among roots of plants, e.g., on *Thymus* (LBÅ, N.E. 1928, p. 113), in England on grass roots (FWL 1887, p. 77). From other regions a preference for limestone has been mentioned (West 1940, p. 34; Dahl 1928, p. 142). However, a definite requirement for lime is not evident.

### Biology

Swedish catches: III: 1; IV: 2; V: 10; VI: 24; VII: 14; VIII: 6; IX: 2; X: 1. Numerous immature beetles found toward the end of August (August 21–23, Gst). The species is definitely a spring breeder and hibernates as an adult. The beetle feeds (according to BLK 1925, p. 27) on worms and snails, and the larva on larvae of *Aphodius* and *Rhynchophora*.

### Dynamics

The species in our region is always fully winged and certainly with flight capacity, even though no corroborative data exist. According to JEA (1941–1942, p. 918) contrarily, “apterous” individuals are also found in southern France.

\**Amara (Percosia) equestris* Dft.  
(*patricia* Dft.)

### Distribution

*Sweden:* A markedly southern species, generally solitary in occurrence. Its distribution might however be uninterrupted and the gaps in the map due to the extreme rarity of the insect. Northernmost localities: Dsl Ärtemark (LTH); Rostock (KLF). Vgl Kinnekulle (BOH, RM! THS 1857, p. 34); Mariestad (LTH); Gullspång (LTH). Vrm Kil, August 8, 1942, 1 specimen (LDN!). Nke Almby, August 2, 1939, 1 specimen (JNS). Vst (possibly Västerås region, JHN in litt.). Upl Uppsala (several collectors!); Forsmark, August 8, 1942, 1 specimen (HJG!); Skutskär, June 27, 1936, 1 specimen (LTH); Älvkarleö, Bilud-den, July 18, 1937. 1 specimen (Palm!). Hls Iggesund, July 3, 1936, 1 specimen (LTH).

*Norway:* Exclusively in the southeast, 12 localities. West as far as 4 Kragerö



(ULL 1899, p. 295) and Sandnes in Drangedal (N.E.T. 1923, p. 256); north as far as 15 Teksle in Lyngdal (l.c.); 2 Ringerike and 12 Gran (MST 1927a, p. 294).

*Finland:* Only in the south, particularly in the southwest, and sparse; gaps in distribution may not exist however. Northernmost localities: Ab Nystad (SDM, MH!); St Yläne (MNH, MH!); Ta Pirkkala, 1 specimen (GBL!); Tb Jyväskylä (SBJ 1873, p. 105; MH!); Sb Jorois (ELL, coll. LBG); Kb Kontiolahti, 1942, 1 specimen (LBG!); Kl Kirjavalahki (PPP, FA!). Also in Åland and Kökar (LBG! MER, MÅ!), and in Seiskari (THG!) in the Gulf of Finland.

*Russian sector:* No records.

*Adjacent regions:* In Denmark rather rare but quite widely distributed, although apparently absent on Bornholm (West 1940, p. 37). Estonia (SDL 1872; HAB in litt.); Latvia (SDL 1872; ULN 1884; BRM 1930). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360).

*Total area:* Palearctic species (report from North America, HOR 1941, p. 272, not corroborated in Leng 1920). In Europe south as far as Portugal (FUE 1920, p. 160), central Italy (LUI 1929, p. 112), northern Greece (APF 1904, p. 305). The Caucasus (CHD 1846, p. 157); SDR and LDR 1878, p. 75). Kirgizia (HEY 1880–1881, p. 41). Western Turkestan (HEY 1893, p. 22). Western Siberia (among others, PPP 1907d, p. 18).

## Ecology

Fairly definite xerophilous, occurring on open or sparsely shaded soil (for example, forest fringes) with not too dense vegetation and more or less bald patches in between. On sandy or gravelly soil, often with an admixture of loam. Mostly among roots of plants or under dried foliage. Also in sandy fields or on pasture ground, as well as in gravel pits. Always solitary. Its preference for sandy soil has also been reported from other regions (West 1940, p. 37; 124 D.E.Z. 1907, p. 155; NBG 1933, p. 54; FWL 1887, p. 72; E.M.M. 1920, p. 15). According to NBG (l.c.) "especially in forested heathland" among *Calluna*, lichens, moss, etc.

## Biology

Swedish catches: V: 2; VI: 17; VII: 26; VIII: 23; IX: 6; X: 1. Immature beetles exclusively in June, between June 10 (Vgl) and June 25 (Ble). In Denmark numerous larvae were found from March to the beginning of June, and 2 specimens also collected in September (LRS 1939, p. 336). This species is undoubtedly an autumn breeder, hibernating in the larvae stage.

## Dynamics

Wings fully developed, but with a remarkably short apical part. Obviously, not a good flier. The report by CRN (1884, p. 11) from Elberfeld—"rather common in gas water"—would indicate flight capacity (however, see p. 15 above).

## Variation

In Central and Southern Europe the species is rather variable, but homogeneous in our region as *forma typica*.

## Fossil Record

Galicia, glacial (SCL 1916, p. 50).

*\*Amara (Celia) erratica* Dft.

## Distribution

(maps in HDH and LTH 1939, pl. IX; LTH 1939a, p. 247)

*Sweden*: Only in the extreme north, but found in fjelds as well as in the coniferous forest region; one locality even on the coast. Southernmost localities: Nbt Piteå, August 1883, 1 specimen (HGN, HM!); Lyl Sorsele, July 1931, 1 specimen (GTZ!); Tärna, Oltokjaure, June 17, 1939, 1 specimen (LDV, coll. LTH); Pil Arvidsjaur, 1936, 1 specimen (S. RGS, coll. LTH); Lul Pållem, 1940, 1 specimen; Jockmock, 1924, 1 specimen; Sarek, sitojaure, 1939, 2 specimens; Porjus, 1939, 1 specimen (all from LTH). In the Abisko region the species is frequent, otherwise rare throughout.

Doubtful: Lyl Umnäs; Tol Vakkakoski and Karesuando (BRD 1934, p. 229; these refer to "*vulgaris*" ZTT 1840, which is inexplicable as a collective species).

125 Erroneous: Nbt (GLL 1896, p. 20; certainly based on a wrongly identified *interstitialis*, WBG, RM!).

*Norway*: Likewise only in the north; in southern Varanger not rare, found in several localities (SPS 1894, p. 63). Additionally, only the following localities: 39 Karasjok; 38 Lakselv (JEN, according to STA); 35 Tromsdal, 1 specimen (SPS 1888–1889, p. 112); Møen in Målselv and Vassdal (according to STA); 34 Bö in Vesterålen (SPS l.c.), and southernmost in Saltdal (SPS l.c.; MST 1927a, p. 299).

*Finland*: Several localities in the northern half of the country. Southernmost localities: Ob Kemi (coll. EHN, MÅ!); Ks Kuusamo (ARO, MH!); Ok Suomussalmi (CRP!), Ruhtinassalmi (SSK, 9 specimens, MÅ!). Additionally, an isolated locality in the Isthmus of Karelia; Ik Metsäpirtti, July 1921, 1 specimen (KRG, N.E. 1921, p. 114; coll. LTH).

Erroneous: Numerous localities in the southern half of the country (SBJ 1873, p. 109), which are undoubtedly based on confusion with *famelica*.

*Russian sector*: In the western part of Kola Peninsula four localities, east as far as Lt Kola (PPP 1905, p. 96; MH!); also near Lj Ponoj (PPP l.c.; MH!). In southern Karelia near Kn Juustjärvi (PPP 1899a, p. 14; MH!).

Doubtful: Kn Petrosawodsk (GÜN, according to PPP 1899a; no voucher specimen).

Erroneous: Lt Nuortijärvi (PPP 1905 = *nigricornis*, FA!).

*Adjacent regions*: No records.

*Total area*: Circumpolar species. In Europe boreoalpine, found in the north, then east as far as Pechora (SBJ 1898, p. 339), and in nearly all higher montane regions of Central Europe (see HDH and LTH 1939, p. 143). The Caucasus (CHD 1846, p. 157; SDR and LDR 1878, p. 72; MB!). Siberia (among others, SBJ 1880, p. 36; 1882, p. 189), east as far as Lena (PPP 1906b, p. 49; MH!) and Kamchatka (JAC 1905–1908, p. 359; WUO, MH!). North America, widely distributed (Leng 1920, p. 60). For doubtful records, see HDH and LTH (l.c.).

### Ecology

On fairly dry meadows and grassland, in open situations exposed to the sun, with moderately dense but not very tall vegetation, especially on gravelly soil (moraine). Partly in clearings in the *reg. bet.*, and more sparsely in the higher reaches of the coniferous-forest region, partly in the rich meadows (*Trollius* meadows; BRD 1934, pp. 89, 228) of the *reg. alp.* (in the Abisko region as  
126 far as 950 m above sea level; BRD l.c.). In Central Europe mainly above the timber line on grassy ground. According to PPP (1910a, p. 318) in the Yenisey region in the tundra. Highly heliophilous.

### Biology

Found in northern Fennoscandia throughout the short summer. Immature beetles from July 29 to August 16 (Tol). Hibernation of mature beetles cannot be doubted. Whether the larvae hibernate together with the adults is still not certain. Cohibernation has been reported from Central Europe (XAM, according to BLK 1925, p. 28; also in LRS 1939, p. 520), but the identification of the material must be considered doubtful.

### Dynamics

Wings fully developed and certainly functional. However, no flight observations recorded to date.

\**Amara* (s. str.) *eurynota* Panz.  
(*acuminata* Payk.)

Distribution

*Sweden*: From Skå to Ång, Jtl, and southern Vbt moderately densely but probably continuously distributed; however, not reported to date from Hjd. Northernmost localities: Jtl Åre, 1941 (BGW!); Ång Hoting, 1936, 9 specimens (LTH); Tåsjö (CDG, E.T. 1931, p. 164! BRC, RM!); Lyl Lycksele, 1938 (B. Persson); Vbt Hällnäs. Bodarna, 1935 (HEQ!); Vindeln, 1930 (LTH and Palm 1934, p. 40!). Farther north the map shows a gap, which could very well be actual. Then six localities in Nbt, south as far as Luleå (3 specimens, LTH), north as far as Över-Kalix, 1938 (3 specimens, LTH) and two localities in the adjacent parts of Lul: Pålkem, 1940 (LTH), 1942 (WRN!); Nelkerim or Mattisudden, 1843 (BOH, manuscript in K.V. Ak.). Quite isolated near Tol Abisko, 1 specimen, July 14, 1939, on railway embankment, certainly only accidental (LTH).

Doubtful: "Lapp. borealis" (ZTT 1828, p. 21).

*Norway*: Widely distributed in the southeast, north as far as 24 Lågendalen in Dovre. On the southern coast only one locality: 5 Kristiansand; three localities in the Stavanger region however (HLS 1915, p. 28). Otherwise absent in the western part of the country. Farther north only six localities, some of which widely separated: 26 Hitra (SHY 1879, p. 19); 27 Trondheim and 127 28 Steinkjer (N.E.T. 1937, p. 146); 30 Vefsn, Klovimoen (STE, 3 specimens, MO!); 32 Saltdal, two localities (several collectors, according to STA).

*Finland*: In the southern and central parts rather widely and apparently continuously distributed. Northernmost localities: Ob Uleåborg (WUO, MH!); Ok Ristijärvi (HLL); Kuhmoniemi (VLE, MH!). Farther north only three localities: Ob Torneå, 4 specimens (LBG!); Ks Kuusamo (MKL, MH!); Lk Kittilä (HLM, coll. NUM).

*Russian sector*: Kola Peninsula, two localities on the southern coast (PPP 1905, p. 97; Varsuga, MH!) and one in the west: Lm Hirvasjärvi (PPP l.c.). Several localities in southern Karelia (several collectors!), north as far as Kn Perguba (PPP 1899a, p. 14).

*Adjacent regions*: In Denmark widely distributed and rather frequent, but to date not found on Bornholm (West 1940, p. 34). Estonia, including Ösel (HAB 1936a and in litt.; Palm!); Latvia (among others, SDL 1872), Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360), also Ireland (JHS and HLB 1902, p. 574).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 152), Corsica (DEV 1935, p. 46), southern Italy, including Sardinia, Sicily, Malta (LUI 1929, p. 108), and Greece (OTZ 1886, p. 210). In the north-east as far as Pechora (SBJ 1898, p. 339). Northern Africa (BED 1895-1914, p. 171). Asia Minor (APF 1904, p. 301). The Caucasus (SDR and LDR 1878,



p. 72; ECH 1930b, p. 217). Western Siberia (HEY 1880–1881, p. 37; WUO, MH!).

### Ecology

On open, sun exposed, mostly cultivated soil (i.e., fallow land, refuse heaps, etc.) often with tall but sparse growth of “weeds,” for example *Rumex crispus*, *Polygonum aviculare*, *Capsella*, thistles and similar plants. The species is thus strongly favored by culture and exclusively synanthropic, particularly in the north. Prefers moderately dry, loam-mixed gravelly soil (see NBG 1933, p. 56). Also in northern Germany predominantly on cultivated soil (NBG 1929, p. 124, l.c.). The slight requirement for lime assumed by Dahl (1928, p. 136) has been rightly refuted by NBG (1933). Highly heliophilous.

### Biology

Southern Swedish catches: III: 3; IV: 8; V: 19; VI: 25; VII: 16; VIII: 22; IX: 25; X: 6; XI: 1; XII: 2. The decline during midsummer is still more pronounced in Denmark (LRS 1939, p. 335). Numerous immature beetles found between 128 July 9 (Ång) and September 2 (Jtl) (in southern Sweden between July 17 and August 24). In Denmark larvae observed from the end of May to the beginning of July (LRS l.c.). It is certainly a spring breeder, hibernating as an adult; the record of oviposition (MJB 1906, p. 1) near Stockholm in September most undoubtedly be a rare exception. Whether in Central Europe, as assumed by BUR (1939, p. 121), normally the larvae of the “autumn generation”<sup>4</sup> hibernate and not the adult, I shall not venture to refute, but indeed shall question (see data of Rapp 1933, p. 101). Beetles have been seen feeding on the “milk ripe” seeds of *Capsella* (BLK 1925, p. 27) and the stamens of *Scabiosa* (JNR 1905, p. 164). They were also found on an umbel of *Anthriscus silvestris* near Jtl Stugun, July 15, 1935 (LGN!).

### Dynamics

Wings fully developed. Observations of flight: Vrm Lundsberg, spring of 1941 (WRN); Mecklenburg (NBG in litt.). One specimen found in sea drift in Finland (Frey 1937, p. 437).

### Fossil Record ?

Finland, Ik, postglacial; doubtful identification (PPP 1911, p. 36).

<sup>4</sup>BUR (1939) distinguishes summer and autumn generations among carabids, even in cases where the hibernating beetles undoubtedly belong to one and the same brood.

\**Amara* (s. str.) *famelica* Zimm.  
(*vulgaris* Thoms. nec Fbr.)

#### Distribution

*Sweden*: Rare throughout; distribution lacks continuity. Skå Kämpinge, 1886, 1888 (PTT, RM! MB!); Falsterbo, 1938 (HZE!); Lund (THS 1867a, p. 45); Ven, 1934 (Palm 1935, p. 9); Hälsingborg (MLG 1863, p. 29); Vittsjö (THS, 2 specimens, MB!). Hll Halmstad (HRM, ML!); Fjärås (SDN, MG!); Onsala (LTH); Släp (SDN, MG!). Små Ryssby, 1925 (GTZ!). Öld Böda, 1939 (HNS, RM!). Gtl När, July 1929, 2 specimens (Palm!). Compare Göteborg region (several localities and collectors!); Mariestad, 8 specimens (LTH). Dsl Bolstad, 4 specimens (LTH). Vrm Säffle (LTH); Skoghall (Palm and LTH 1937, p. 119!); Ölme (LTH); Kristinehamn and Visnum (WRN); Arvika, Gränsjön (EVK!). Stockholm (OLS!). Upl Ingarö (LBL, RM!); Viggbyholm (FIE!); 129 Uppsala (several collectors!). Gst Hedesunda (Palm). Dlr Horndal (Palm!); Stora Skedvi, Södersåtra (TJB!); Gustavs, Solvarbo (KLF, det. JNS); Rättvik (KLF!); Orsa (UYT 1909, p. 298, and in litt.). Hls Ljusdal, 1944 (SJB). Ång Forsmo, September 17, 1940, 1 specimen (BRD!); Tjärn (northeastern Ruske), June 1939, 1 specimen (BRC, RM!). Vbt Hällnäs, Bodarna, April 17, 1935, 1 specimen (HEQ!).

Doubtful: Nke Almby (JNS, E.T. 1915, p. 203; no voucher specimen).

Erroneous: Lapland (ENW, according to GLL 1896, p. 21). This record is based on a wrongly identified find from the Kola Peninsula (see E.T. 1884, p. 164).

*Norway*: Only in the southeast, but apparently continuously distributed. North as far as 2 Vikesund (HLS 1891a, p. 15; MST 1927a, p. 293); west as far as 16 Hiterdal (HLS l.c.) and Kragerö.

Doubtful: 13 Laurgård in Sel (SHY 1879, p. 19; no voucher specimen).

Erroneous: Three northern localities (SHY l.c., "*vulgaris*"; see MST 1927a, p. 293).

*Finland*: Distribution discontinuous. I. In the southwest, east as far as Helsinki (several collectors!); north as far as St Raumo (SDM, MH!); Ta Pirkkala and Tammerfors (GBL); Pälkäne (SDM, MH!). II. In the south-east, west as far as Ka St. Johannes (PPP, FA!); Sa Villmanstrand (HDL); St. Michel (EHN, MH! MÅ!); north as far as Sb Jorois (ELL, coll. LBG!); Kuopio (EHN, MH!); Nilsä (LEV, coll. LBG! coll. HLL! Also in Hogland (SRS, MH!) and Peninsula (HLL!) Islands, in the Gulf of Finland, and near Al Mariehamn, 1942, 15 specimens (LBG!). Farther north two solitary reports: Oa Vasa, Korsholm, June 7, 1918, 1 specimen (RDL!); Om Kälviä (SBJ, MH! MÅ!). Because the occurrence of the species is so rare, it is not possible to determine whether these partial areas actually are continuous or not.

*Russian sector*: Only in southern Karelia, five localities, here and there

numerous (several collectors!), north as far as Kn Jalguba (PPP 1899a, p. 15; MH!).

Erroneous: One locality on the Kola Peninsula (PPP 1905, p. 97, = *nigricornis*, MH!).

*Adjacent regions*: In Denmark very rare, only in Jylland and from two localities in Sjaelland (West 1940, p. 34). Estonia (HAB in litt.; Palm 1943!), but to date not found on the northern coast; Latvia (SDL 1872; LCK in litt.). To my knowledge, not known from Leningrad region. British Isles, only England (Joy 1932, p. 361).

*Total area*: Palearctic species. In Europe predominantly eastern species, occurring west as far as southern England and Holland (EVS 1898, p. 82; 1922, p. 31); absent in France. South as far as northern Italy (LUI 1929, p. 107),  
 130 Serbia (APF 1904, p. 301), Transylvania (PTI 1912, p. 29). Iran (BOD 1927c, p. 43). The Caucasus (SDR and LDR 1878, p. 72). Western Turkestan (HEY 1880-1881, p. 37). Afghanistan (HEY 1896, p. 15). Western Siberia (SBJ 1880, p. 36; RM!).

### Ecology

Besides *plebeja*, this is the only species of *Amara* which is regularly associated with water (see also MST 1927a, p. 293). It is somewhat hygrophilous, but prefers to live in open, flat lakesides under foliage, residual grass, or loosely placed stones on loam with sandy or gravelly soil. Usually occurs in places with a fairly rich but not too tall vegetation of grass or *Carex* with bald patches here and there. Solitary in sand pits (also in Denmark; SDT 1841, p. 187) and moorland covered with *Calluna*. Occurrence in the latter, however, appears to be normal for Germany (PLZ 1938, p. 50; HOR 1941, p. 258), sometimes together with *Bembidion nigricorne* (E.B. 1911, p. 18; 1913, p. 260), even with *A. sprete* (PLZ 1937, p. 9; NBG 1933, p. 56), and hence in quite dry places.

### Biology

Distribution of the few Swedish catches: III: 2; IV: 6; V: 8; VI: 12; VII: 4; VIII: 1; IX: 1. An obvious spring species in Denmark also LRS (1939, p. 336). An immature beetle was found on July 23, 1933 (Dsl Bolstad). As assumed by LRS (l.c., p. 406), it is apparently a spring breeder, hibernating in the adult stage.

### Dynamics

Wings fully developed and species undoubtedly with flight capacity, but no corroborative data available.

## Fossil Records ?

Bavaria, glacial (FLH 1884, p. 6). Identification must be considered highly unreliable.

\**Amara* (s. str.) *familiaris* Dft.

## Distribution

*Sweden*: Except for the fjeld regions, distributed throughout the country (although not found to date in Hjd), and usually very frequent. Highest or northernmost localities are: Dir Särna (several collectors); Jtl Enafors (leg. ? MG!); Ånn (LTH); Jorm (JNS and Palm, E.T. 1936, p. 184); Åsl Saxnäs (NST, coll. LTH); Vilhelmina (LTH); Lyl Sorsele, several localities (GTZ, E.T. 1932, p. 53!); Pil Loholm (PRS, ML!); Arvidsjaur (LTH); Lul Pålkem (LTH, WRN!); Murjek (RDB, ML!); Gällivare (KMN, ML!); Toi Vittangi, July 29, 1938, 1 specimen (LTH).

*Norway*: Likewise distributed almost throughout the country, well as far as latitude 69° N; however, not reported to date from the outer region of rocky headlands in the western part. Absent in the true fjelds. Northernmost localities: 34 Lofoten, three localities; 36, five localities in Målselv (SPS 1888–1889, p. 113; N.E.T. 1932, p. 26; STA in litt.); 35 Finnsnes (SPS, according to STA).

*Finland*: South of latitude 65° N distributed throughout the country. In the north becomes scarcer, and represented by the following localities north of latitude 66° N; Ob Ylitornio (MER, MÅ!); Pello (MHJ, MH!); Rovaniemi (KNG); Ks Paanajärvi (PFF! HLL); Salla (ENW, LNN, MH!); Lk Muonio (MTL, MH!); Pallastunturi (MER, MÅ!).

*Russian sector*: Kola Peninsula, one locality in the west: Lt Nuortjaur (PPP 1905, p. 96; MH!). In southern Karelia many localities (several collectors!), north as far as Kn Semsjärvi (CRP!).

*Adjacent regions*: In Denmark, including Bornholm, found everywhere and very frequent (West 1940, p. 34). Estonia, including Ösel (SUM 1931; HAB 1936a); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 361), also Ireland (JHS and HLB 1902, p. 575). Iceland, introduced (LTH 1931, p. 177).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 153), southern Italy (LUI 1929, p. 108), Greece (OTZ 1886, p. 210). In the northeast as far as Pechora (PPP 1907c, p. 309). Northern Africa (BED 1895–1914, p. 172). The Caucasus (CHD 1846, p. 160; SDR and LDR 1878, p. 72). Western Siberia (among others, SBJ 1880, p. 36; JEN, MO!). Northern Mongolia (JEN, MO!).



## Ecology

One of the most frequent and most eurytopic species of *Amara*. Found on every moderately moist to dry soil (loamy, sandy, gravelly, humus, peat); however, it seems to prefer soil with an admixture of sand. In open, usually sun exposed places with fairly rich but not too tall vegetation. Tolerates moderate  
 132 shade. Strongly favored by culture, exclusively synanthropic, especially in the north, but even otherwise always abundant in fields and gardens overrun with "weeds". Highly heliophilous.

## Biology

Southern Swedish catches: II: 1; III: 6; IV: 37; V: 130; VI: 151; VII: 69; VIII: 35; IX: 10; X: 4; XI: 1. In Denmark the number of adults drops sharply as early as June (LRS 1939, p. 336). Numerous immature beetles from July 14 (Skå) to August 23 (Ögl). In Denmark larvae occur in July. Hence a spring breeder, hibernating as an adult. In Denmark observed feeding on sepals and stamens of *Stellaria* (EHT, E.M. 1901, p. 121), in Central Europe observed in large quantities "in the panicles of flowering *Poa pratensis*" (BLK 1925, p. 28). NDM (in litt.) found several specimens near Helsinki, June 3, 1943, which had opened the capsules of *Cerastium*, purportedly to attack the larvae of *Phytonomus* species. On July 9, 1944 (Upl Djursholm) I studied numerous specimens on *Cerastium tomentosum*, which had likewise bitten through the capsules, and found that they consumed unripe seeds; there was no damage by any other insect.

## Dynamics

Wings fully developed and several observations of spontaneous flight available (all during May and June), also from Germany (GRD 1937, p. 76). Numerous beetles in sea drift from Finland (Frey 1937, p. 437; STÅ 1938, p. 19; PME 1944, p. 38).

\**Amara (Bradytus) fulva* De G.

## Distribution

(map in LTH 1939a, p. 246)

*Sweden*: All of southern and central Sweden, as well as the lower parts of Norrland, and continuously distributed as far as the Finnish border. The highest or northernmost localities are: Dlr Idre (Sthen, coll. FRL!); Hjd Vemdalen (CDG!); Jtl Rätan, 1840 (ZTT, ML!); Revsund, 1 specimen (BGW!); Ragunda (FRI, 3 specimens VA!); Ång Sollefteå (ARN, according to JNS); Åsl Åsele, 1884 (TIM, LU!), 1936 (LTH); Lyl Storuman 1936, 2 specimens

(LTH); Sorsele, 1921, 1 specimen (GTZ, E.T. 1932, p. 52); Vbt Jörn, 1925, 1 specimen (LTH); Nbt Harads, 1938, 5 specimens (LTH); Täreändö, 1938, 1 specimen (LTH); Pajala, 1938, 7 specimens (LTH); Tol Vittangi, July 29, 1938, 6 specimens (LTH).

133 *Norway*: Only in the south and southeast but then frequent and apparently continuously distributed (MST 1927a, p. 300). Except for some localities in the southwest—6 Jäeren, several localities, and Ryfylke, two localities (HLS 1915, p. 30)—exclusively east of the main watershed of Scandinavia. Highest localities: 15 Ål; 23 Røysheim in Böverdalen (N.E.T. 1923, p. 256); 24 Vågå and Lom, several localities; 25 Røros (N.E.T., l.c.).

*Finland*: Except for the extreme north, distributed throughout the country, but north of latitude 65° N sporadic and rare; Ob Kemi (EHN, MÅ!); Torneå (LBG!); Ks Kuusamo (HLL), Paanajärvi (PFF); Lk Sodankylä, 12 specimens (LBG!); Kittilä (SAD, MH!); Li Ivalojoensuu (CST, MH! LBG!); Lp Pitkajärvi, June 22, 1929 (STÅ).

*Russian sector*: Kola Peninsula, in the west near Lt Kola (PPP 1905, p. 95), in the southeast three localities, east as far as Lv Tetrina (PPP l.c.; MH!). In southern Karelia, four localities (several collectors!).

*Adjacent regions*: In Denmark, including Bornholm, widely distributed and frequent (West 1940, p. 36). Estonia (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 362), also Ireland (JHS and HLB 1902, p. 573).

*Total area*: Palearctic species (doubtful from North America, Leng 1920, p. 60). In Europe south as far as southern Spain (FUE 1920, p. 158), southern Italy (LUI 1929, p. 110), Bulgaria (APF 1904, p. 305). In the northeast as far as Pechora (PPP 1907c, p. 309). Asia Minor (ECH 1922, p. 34). The Caucasus (JAC 1905–1908, p. 361). Western Siberia (among others, SBJ 1880, p. 34; RM!).

### Ecology

A xerophilous species, which preferably lives on pure sand, even where it is very dry and almost barren, for instance, coastal shifting sands, where the beetle prefers to live inside and on fascicles of *Elymus*; buried during the day. Generally found in open places that may be unshaded or poorly shaded. However, not exclusively a sand species, and KRG's (1932, p. 100) inclusion of it among the stenotopic (eucönen) Finnish species of shifting sand does not appear justified to me. It lives equally well in all kinds of almost continuously overgrown sandy soil, consisting of much coarser material, even with a considerable admixture of gravel or loam. I have found it several times even on dry heaps of sawdust. Accordingly the chief requirement of the species appears to be a surface layer that is loose enough to permit its daily burrowing, and  
134 the other mechanical and chemical characteristics of the particles are thus

subordinate in significance. Not rare on sandy cultivated soil, e.g., fallow land. Observed on "heavy" soil also in Germany (GRD 1937, p. 46) and gravelly soil in Denmark (West 1940, p. 36).

### Biology

Southern Swedish catches: III: 3; IV: 9; V: 37; VI: 78; VII: 43; VIII: 43; IX: 5; X: 1. Abundant immature beetles found between June 11 (Vgl) and July 21 (Ble), in Tol even until July 29. In Denmark two larvae observed in December and one in May (LRS 1939, p. 338). The species is undoubtedly (as assumed by LRS l.c., p. 410) an autumn breeder, hibernating in the larval stage; small number of mature adults also hibernate. The beetle has been seen nibbling grass seeds and potato stems, probably just to slake its thirst (NOT 1943, p. 36).

### Dynamics

Wings fully developed, with apical part almost as well developed as in *consularis*. The species is undoubtedly with flight capacity, but flight observations not available. I conducted experiments with exposure to sunlight and warmth but to no avail.

### Variation

KRG (1932, p. 179) has described from Finland a weaker-pigmented form from shifting sand, which is distinguished primarily by broader foretibiae (Fig., l.c.). Such individuals have been found in Sweden also, even in the inland, at places where the soil is especially fine grained, thus where the insects can burrow deeper with greater ease. There are all kinds of intermediate forms too, leading to the *forma typica*. I consider "*f. arenaria*" solely a modification. The problem can only be conclusively resolved through breeding experiments.

\**Amara (Celis) fusca* Dej.  
(*complanata* Dej. var. *fusca*)

### Distribution

*Sweden*: Exclusively from Skå and known with certainty only since 1934; Simrishamn, May 7, 1939, 1 specimen (HZE!); Kåseberga, June 9, 1935, August 1936, May 2, 1937, several specimens (Palm!); Lilla Bedinge, Äspöholm, July 20, July 21, 1943, 5 specimens (CHR!); Kungstorp, August 9, 1936, 1 specimen (LTH); between Harlösa and Silvåkra, September 20, 1936, several specimens (NYH!); Södra Sandby, September 5, 1943, 1 specimen (CHR); Lomma, August 1936, 3 specimens (Palm!); Löddeköpinge, September 1, 1939, 3 speci-



mens (KMN, ML!); Ven, May 1934, 1 specimen (Palm 1935, p. 9!). Possibly the species was collected in Sweden much earlier because there is one specimen in the coll. Roth (ML!) labeled "70" (possibly = 1870) followed by some undecipherable letters; the species has been included in the Catalogus of Scandinavian Coleoptera (ML) written by Roth in 1883, with no additional information.

Not known from the rest of Fennoscandia, the Baltic States, or Leningrad region.

*Adjacent regions:* In Denmark only two localities in northern Sjaëlland, as well as near Arnager on Bornholm (West 1940, p. 35). British Isles, only England (Joy 1932, p. 360).

*Total area:* Palearctic species. In Europe predominantly a western species, south as far as southern Spain and the Balearic Islands (FUE 1920, p. 154), northern Italy (LUI 1929, p. 109), Dalmatia (*complanata* Dej., *loc. class.*). East as far as southern Russia (JAC 1905–1908, p. 359). According to HOR (1941, p. 260) in Germany "apparently in the process of dispersal east and north". Northern Africa (BED 1895–1914, p. 172). Asia Minor (BOD 1927a, p. 40). The Caucasus (SDR and LDR 1878, p. 73). Turkmenia (HEY 1896, p. 16). Western Siberia (HEY 1880–1881, p. 38).

### Ecology

The Swedish records are from dry sandy or gravelly soil with little continuity of vegetation. The six specimens of CHR were found under *Artemisia campestris*: the single specimen collected by me was found in a small gravel pit (locality of *Orobancha major*); all of Palm's collections were from sandy soil. Also in Central Europe collected exclusively on sand and gravel (West 1940, p. 35; NBG 1934; E.B. 1936, p. 270; HOR 1941, p. 261), even on dunes on the sea (JEA 1941–1942, p. 929), "sometimes with loamy or clayey subsoil" (NBG 1934). A requirement for lime has been assumed (HUB, D.E.Z. 1902, p. 261; NBG, E.B. 1936, p. 270). Mention has been made of "gravel pits, light cultivated soils, inland dunes, bits of land and refuse dumps" (NBG 1934); also in Germany found repeatedly under *Artemisia campestris* (E.B. 1936, p. 270). NBG  
 136 (in HOR l.c.) has made this interesting remark: "I believe that the apparently more numerous incidence of this species is related to the increasing use of certain synthetic fertilizers."

### Biology

Most of the Swedish specimens were caught during August and September, and also in Germany mainly during late summer (HOR l.c.); in Denmark, contrarily, most of the specimens were collected in June (which, however, could be coincidental since there it has only been recorded to date from three



localities). LRS (1939, pp. 337, 407) has concluded from this data that the species breeds in spring, but I saw two immature beetles from Skå Kåseberga, June 9, 1935, and from Bornholm, May 20, 1933 (SUS). One may thus assume that it is, on the contrary, an autumn breeder, which hibernates predominantly in the larval stage. However, adults have been found in Germany in winter (E.B. 1936, p. 270).

### Dynamics

Wings fully developed. The species has certainly flight capacity but no corroborative data available.

### \**Amara (Celia) infima* Dft.

#### Distribution

(map in PME, S.H.A. 1939, p. 60)

*Sweden*: An extremely local and in general very rare species, which inhabits an area with little continuity; it readily eludes attention due to its concealed mode of life. In southern Sweden, except for a single record on Öld, Vickleby, July 20, 1933, 4 specimens (SJB!), it is markedly western: Skå Åsperöd (ZTT, according to GYL 1827, p. 446, and THS 1859, p. 241); Kämpinge (several collectors!); Skanör (MLF, according to THS 1868, p. 292; no voucher specimens in coll. MLF, MG); Hälsingborg (VNS, several collectors!). Hll Tylösand, May 3, 1938, 1 specimen (C. Årnell!); Fjärås (ERC, 4 specimens, MG!). Små Södra Unnaryd, July 22, 1940, 1 specimen (LTH); Skillingaryd, July 1939, numerous specimens (JNS!). Vgl. Göteborg region, numerous specimens (several collectors!); Borås region (Öst, MG!). Then five localities in central Sweden: Nke Örebro, 1926–1928 (JNS!). Upl Uppsala, 1 specimen (JHN, LV!); Singö, 1 specimen (RGS!). Dlr Falun, May 1, 1927, 1 specimen (TJB, coll. LTH). Vrm Väse, May 1944, about 10 specimens (WRN).

137 Erroneous: Dlr Horndal (E.T. 1942, p. 12; also in map by PME, S.H.A. 1939; = *tibialis*!).

*Norway*: Only six localities in the south (MST 1927a, p. 299); 15 Kongsberg, several records, among others April 1882; 4 Lillesand, Tingsaker, October 1921; 5 Lister, Kviljo, September 30, 1921 (all in N.E.T. 1923, p. 256); 6 Håland and Utsole on Jæren (HLS 1914; p. 3; 1915, p. 29); 15 Otta in Sel, August 1916 (N.E.T., l.c.).

*Finland*: First discovered only recently (S.H.A. 1935, p. 63; N.E. 1935, p. 109) and known to date only from three regions: I. In the extreme southwest: Ni Tvärminne, 1938, 1 specimen (PME, S.H.A. 1939, p. 60!); Lappvik, 1937, 1 specimen (PRT, according to PME l.c.). II. In the inner southwest: Ta Ruovesi, Siikakangas, numerous specimens (several collectors! PME l.c.). III. Ik Muolaa, 1938, 1 specimen (PME l.c.).

*Russian sector:* Only in southern Karelia: Sv Vaaseni, 1942, 1 specimen (KRV!); Nurmoila, 1942, 1 specimen (PFF!); Kn Karhumäki, June 4, 1943, 2 specimens (PRT!). Also recorded by GÜN from the former Gouv. Olonetsk (PPP 1899a, p. 4).

*Adjacent regions:* In Denmark rare and scattered, but occurs throughout the country, including Bornholm (West 1940, p. 36). In Estonia only two localities: Dorpat, 2 old specimens (HAB in litt.); Ösel, Harilaia, "washed ashore" on the beach (HAB 1936a); Latvia ("Curland," SDL 1872). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 361).

*Total area:* Palearctic species. In Europe south as far as northern France, Paris (DEV 1935, p. 47; doubtful from the Pyrenees), northern Italy (LUI 1929, p. 109), Austria (HOR 1941, p. 266), Hungary (KTY 1900, p. 36). East as far as Ural (JAC 1905–1908, p. 360). Siberia (SBJ 1880, p. 35; RM!), east as far as Lena (PPP 1906b, p. 49).

### Ecology

On open, dry, sandy or sandy-gravelly soil overgrown only in patches by *Calluna*, *Arctostaphylus uva-ursi*, dry grasses, etc. On moraines, glacial rubble (Swedish rullsten grit) or at the sea. The species was studied particularly well near Ta Siikakangas by PME (S.H.A. 1939, pp. 54, 59). It lives there in a wide, flat, treeless heathland (moraine) of the *Cladonia-Calluna* type, but occurs only sporadically under *Calluna*; on the other hand, constantly and in large numbers found in grass hummicks (chiefly *Agrostis vulgaris* and *Nardus*), usually fairly well buried. Near NI Lappvik, one specimen was found on the  
 138 roots of *Ammophila*. In Norway always on *Calluna* soil (HLS 1913, p. 3; 1915, p. 9; MST, N.E.T. 1923, p. 256). In Central Europe likewise (E.B. 1911, p. 18; D.E.Z. 1926, p. 205; E.B. 1930, p. 153; NBG 1933, p. 53; PLZ 1939, p. 5), but a preference for *Cladonia* has also been observed (SRN 1926, p. 25; NBG l.c.); it has also been collected, as in Finland, from grass roots, particularly of *Festuca* (FWL 1887, p. 72; KTZ, E.B. 1938, p. 94; PLZ 1938, p. 50). The occurrence of this species in *Sphagnum* in the Rhineland is unusual (HOR 1941, p. 266).

### Biology

Distribution of the few Scandinavian catches: III: 1; IV: 5; V: 6; VI: 0; VII: 4; VIII: 2; IX: 5; X: 3; XI: 1. The species was collected in very large numbers near Göteborg only during the winter half of the year (October, November, March). A strong decline in June is also evident in Denmark (LRS 1939, p. 337). An immature beetle was found on July 22, 1940 (Små), but I saw two others found in September 1867 (Skå, VNS). LRS's assumption (l.c., p. 408) that *infima* breeds in autumn must consequently be rejected. It is certainly a

spring breeder, hibernating as an adult. PME (l.c.) observed one beetle buried about 5 cm deep in sand, nibbling at the roots of *Nardus*.

### Dynamics

The species was earlier considered brachypterous (see LNZ 1847–1852, p. 286; JEA 1941–1942, p. 932). I have however seen a few specimens (to date one from Sweden, three from Russian Karelia) with fully developed wings, which were certainly with flight capacity. In view of the apparent rarity of the macrop-  
terous form and the pronounced stenotopy of the species, its capability of dispersal has to be rated low.

### \**Amara (Celia) ingenua* Dft.

#### Distribution

*Sweden*: Widely but rather irregularly distributed, and in some regions notably rare. However it has been found in all provinces except Hjd. There are no records from the fjeld regions or north of latitude 66° N. Highest or northernmost localities are: Vrm Vingäng, 1933 (Palm and LTH 1937, p. 119!); Dlr Lima, 1928 (OLS!); HLS (1867, STH, 2 specimens, ML!), Los, since 1922, several specimens (SJB); Jtl Bräcke, 1936, (LTH); Östersund, 1926 (FHL!); Ås, 1942 (BGW!); Ång Hoting, 1936, frequent (LTH); Vbt Umeå (GTZ); Holmsund, 1936 (LTH); Hällnäs, 1936 (LTH), 1938 (HEQ!); Nbt Piteå, 1936 (LTH); Luleå, 1938, 1 specimen (LTH), 1943, 4 specimens (Lindholm, coll. TJB!); Åsl Dorotea, 1936, 2 specimens (LTH); Vilhelmina, 1936, 5 specimens (LTH); Lyl Sorsele, 1928, 2 specimens (GTZ, E.T. 1932, p. 52!). Northernmost reports have thus been published in recent years; GLL 1896 mentions Skå–Jtl.

*Norway*: In the southeast and on the southern coast widely distributed, and along the eastern valleys extends far north. Not reported to date for the outer western parts of the country but, on the other hand, found on the inner end of Sogne Fjord: 19 Fortun and Lærdalsøyri, as well as in 20 Romsdal: Åndalsnes, June 1934 (MST). Also, two localities in Trondheim region (N.E.T. 1937, p. 146), and isolated localities farther north as far as 31 Bodö, June 1925 (LTH).

*Finland*: In the southern half of the country widely, albeit rather irregularly, distributed, but without distinct gaps. Not known on Åland to date. Northernmost localities: Om Haapavesi (HEL, NL); Oulainen (SDM, MH!); Ok Kajana (CRP!); Ob Uleåborg (WUO 1910, p. 64; numerous collections!).

Erroneous: Lk (Catalogus 1939, p. 8; based on a very large specimen of *quenseli* in coll. STN!).

*Russian sector*: Five localities in southern Karelia (several collectors!), north as far as Kn Semsjärvi, 1942 (CRP!).



*Adjacent regions:* In Denmark widely distributed, although not recorded to date on Bornholm, but not frequent (West 1940, p. 35). Estonia (HAB in litt.); Latvia (SDL 1872; BRM 1930). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area:* Palearctic species. In Europe predominantly eastern species (in France only in the southeast; DEV 1935, p. 46), south as far as southern Spain (FUE 1920, p. 154; requires confirmation), northern Italy (LUI 1929, p. 109), Serbia (APF 1904, p. 301). Asia Minor (according to HOR 1941, p. 260). The Caucasus (SDR and LDR 1878, p. 72; LSH 1936, p. 141). Western Turkestan (HEY 1893, p. 22). Western Siberia (among others, MKL 1881, p. 20; PPP 1907d, p. 18; in RM 1 specimen from Omsk; in SBJ 1880, p. 34, as "*consularis*"!).

### Ecology

140 The most strikingly anthropophilous species among *Amara*, which lives also in the southern part of the region almost exclusively in the vicinity of human dwellings, often right in the middle of the city. In fields, farms, refuse dumps, etc., especially beneath *Stellaria media*, *Polygonum aviculare*, large *Rumex*, and other "weeds". The soil must be fairly dry, preferably loam-mixed, often very stony; never found in pure sand or humus. Frequently together with *municipalis*. In Central Europe the species is recognized as "probably halophilous" (HOR 1941, p. 260); it seems to prefer saline soil, and its frequent occurrence in refuse dumps (BLK 1925, p. 28; Dahl 1928, p. 138; JEA 1941-1942, p. 930), as in the case of *convexiuscula* could be due to a "certain salt content". However a dependence on NaCl does not seem indicated, as revealed by its occurrence in Fennoscandia; on the contrary, a possible association with nitrate could be considered, and its occurrence in fields (as assumed by NBG for *fusca*) might possibly be related to the use of synthetic fertilizers. In Silesia found "in *Festuca* roots" (PLZ 1938, p. 50).

### Biology

Southern Swedish catches (as far as Hls): III: 2; IV: 8; V: 14; VI: 16; VII: 10; VIII: 18; IX: 25; X: 7; XI: 0; XII: 1. Also in Denmark maximum abundance occurs in September and a second one in April (LRS 1939, p. 337). Numerous immature beetles from June 23 (Upl) to July 23 (Små), in the north until July 29 (Jtl). In Denmark (LRS l.c.) numerous larvae in June. The species therefore certainly breeds during spring, and hibernates as an adult. Adults and larvae purportedly feed in captivity on rolled oats (BLK 1925, p. 28).



## Dynamics

Wings fully developed. Spontaneous flight of beetles observed on September 16, 1931 during the day (Stockholm, LTH), and on September 2, 1922 and September 9, 1924 at night (Hls Los, SJB); flight also observed in France (JEA l.c.).

\**Amara (Celia) interstitialis* Dej.

## Distribution

*Sweden*: In the Norrland forest region and coastal regions of the Gulf of Bothnia widely distributed and locally even frequent; on the other hand, very rare in the true fjeld regions. Otherwise actual gaps in distribution might not exist and the absence in Hjd might well be only apparent. Southernmost localities: Dlr Falun, Jungfruberget (KLF, coll. JNS!), May 1920 (TJB, E.T. 1928, p. 25!); Lima, numerous (Dahl, according to TJB l.c.! OLS!); Särna and Idre (AND, LF); Jtl Ånn, 2 specimens (LTH); Östersund, 1 specimen (FHL!); Ång Örnköldsvik, 1 specimen (LTH); Vbt Umeå (GTZ!), July 11, 1936, common (LTH); Vindeln, 1 specimen (LTH and Palm, 1934, p. 40!); Hällnäs, 2 specimens (HEQ!); Bureå, 1 specimen (LTH).

Doubtful: Vgl (SCH, RM!); Små, 1 specimen, with no other locality data (WRN!). Occurrence in montane part of southern Sweden cannot be entirely ruled out (see *Pterostichus adstrictus*) but not reported to date.

*Norway*: I. Six localities in an apparently isolated region in the central south, with these delimiting localities: 13 eastern Gausdal, Rokvatn; 23 Böverdal, near Røysheim; 24 Fokstua in Dovre; 13 Musvollseter in Rondane. II. Trondheim region, south as far as 27 Trondheim and 28 Hell in Stjördal (N.E.T. 1937, p. 146), and from there seemingly continuous right as far as southern Varanger in the extreme northeast. However, the species is totally absent in the extreme northern peninsulas. Northernmost localities: 35 Skjervøy (SPS); 38 Alta, Bossekop (MST); Lakselv in Porsanger (STA, JEN).

*Finland*: Distributed throughout the country (except for Åland) but more numerous and more frequent only between roughly latitude 64° N and 68° N. Very rare in the extreme south and found only in the coastal region, so that north of there a possible gap may occur. Coastal localities: St Raumo and Ab Nystad (SDM, MH!); Ab Åbo and Villnäs (MNH, MH!); NI Helsinki (SBJ 1873, p. 109; HJT, MH!); Helsing (STN!); Ka St Johannes (PPP, FA!); Ik Muolaa (PFF); Metsäpirtti (KRG!); Konevitsa (SBJ, MÅ!). Northernmost near Lp Parkkino (KRV!) and Trifona (LBG!).

*Russian sector*: Kola Peninsula, three localities in the west (PPP 1905, p. 96; MÅ! FA!). Kr Soroka (PPP 1899a, p. 14; MH!). In southern Karelia near Ko Petrosawodsk (PPP 1899a; MH!) and in several localities east of Ladoga (several collectors!).

Doubtful: Lj Sergej-ostroff near Ponoj in the tundra region (PPP 1905, p. 96; 1910a, p. 318; no voucher specimen).

*Adjacent regions:* Absent in Denmark and, according to my knowledge, also in the Baltic States. On the other hand, found in the Leningrad region (OBT 1876), Leningrad (SCK, coll. LBG!).

*Total area:* Circumpolar species. In Europe, outside the region, found only in northern Russia, south as far as Gorki (JAC 1905–1908, p. 359), in the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 309). The Caucasus (JAC l.c.; RTT, MB!). Siberia (among others, SBJ 1880, p. 35; RM! JEN, MO!), east as far as Lena (PPP 1906b, p. 49), Amur (HEY 1880–1881, p. 38) and Kamchatka (BNN, NET, SBR 1929, p. 4). North America, doubtful according to Leng (1920, p. 60); I saw one specimen from British Columbia (MB!).

### Ecology

Found in open, sun exposed, but not quite dry places, with more or less continuous and not too tall vegetation consisting of grasses and herbs. Prefers loamy and gravelly soil and is absent in pure sand. Greatly favored by culture (also see SPS 1888–1889, p. 113) and reaches its maximum frequency in the vicinity of human dwellings, for example, among “weeds” in farms and gardens. It is a typical member of the high boreal forest fauna, but already very rare in the *reg. bet.* (i.e., Abisko region), and totally absent in the *reg. alp.* (1 specimen, July 15, 1939, Abisko, Nuolja, just below the timber line, possibly a stray specimen); the record from Lj Ponoj (see above) is doubtful. Likewise outside the region no definite evidence of occurrence in the alpine region; records from Yenisey region (MKL 1881, p. 21; PPP 1910a, p. 318) uncertain (see SBJ 1882, p. 189); the record from Lena (PPP l.c.) refers to a single specimen found inside a house.

### Biology

Found throughout the short Nordic summer, but most frequent during spring (see also PPP 1910a, p. 318). Numerous immature beetles found in July, between July 9 (Ång) and July 28 (Nbt), in northern Norway during August (SPS 1910a, p. 76). Hibernates as an adult.

### Dynamics

Wings fully developed. On June 8, 1930 beetles were seen flying in very bright sunlight near Nbt Över-Torneå (LTH).

## Variation

Unusually variable in color, ranging from bluish to grass-green or brass-yellow. Beetles which have hibernated are often almost nonmetallic black. These forms exhibit no geographic affinity and are zoogeographically inconsequential.

## Systematics

JEA (1941–1942, p. 928) has proposed that *interstitialis* should be considered only a subspecies of *erratica*; his suggestion is based without doubt on insufficient material. These two species differ in several constant characters not even mentioned by JEA (see LTH 1942a, p. 191; 1943a, p. 46). In the northern Fennoscandian forest region the two species are found together without intermediate forms.

\**Amara* (s. str.) *littorea* Thoms.  
(*kodymi* Jedl.)

Distribution  
(map in LTH 1943c, p. 49)

*Sweden*: Skå Lomma (THS 1859, p. 247; 2 specimens, MB!); Ringjön (THS, coll. RGS!), Stehag, June 1881, 2 specimens (MLC, HM!); Hälsingborg (MLG 1863, p. 28; E.T. 1904, p. 106). Hll Fjärås, 1 specimen (SDN, MG!); Släp, 1 specimen (SDN, MG!). Små Nottebäck (VYL, 1 specimen, ML!); Kalmar, 1864 (STH, 1 specimen, ML!). Gtl Visby, May 5, 1940, 5 specimens (LTH); Lau, June 17, 1942, 1 specimen (BGW!). Vgl Göteborg, 1 specimen (SDN, MG!); Borås, September 10, 1943, 1 specimen (SVS!). Ogl Tåkern, 1 specimen (LBL, RM!), October 16, 1928, 1 specimen (Palm!), Alvastra, September 27, 1935, 1 specimen, Omberg, June 13, 1941, 1 specimen (LOH, MG!). Nke Örebro, May 28, 1939, 1 specimen (JNS!), Sdm Nacka, May 24, 1931, 1 specimen (OLS!); Erstavik, November 21, 1943, 1 specimen (LLR!). Stockholm (VYL, 1 specimen, MU! 1 specimen, coll. THS, MB!). Upl Runmarö, 1 specimen (HFS, LÖ!); Uppsala, April 1906, 2 specimens (WRN!); Erken, May 25, 1941, 1 specimen (LTH); Singö, 1 specimen (RGS!); Forsmark, August 8, 1942, 1 specimen (HJG!). Hls Bollnäs, October 8, 1942, 1 specimen (ALM!). Jtl Ragunda (FRI, 1 specimen, VA!). Nbt Över-Kalix, 2 specimens (AGR!). Tol (leg. ?, 1 specimen, RM!). Abisko, Jebrenjokk, July 25, 1 specimen (SLL, according to BRD 1934, p. 228!).

Doubtful: Hls (GLL 1896; no voucher specimen).

Erroneous: Hjd (MST 1927a, p. 291). Undoubtedly confused with the record of *nigricornis* in GLL 1896.

*Norway*: Very rare and exclusively in the southeast, seven localities (all in MST 1927a, p. 291): 1 Halden (N.E.T. 1923, p. 255). 2 Oslo region, two



localities (HLS 1891a, p. 14). 15 Kongsberg, 2 specimens 12 Hamar (HLS l.c.). 13 Laurgård in Sel, 2 specimens 24 Sörem in Vågå; Kirkestuen in Dovre.

*Finland:* I. In the southwest: NI Helsinki (SBJ 1873, p. 110; coll. SAA! KRV); Helsing (WLL). Ab Åbo (SBJ l.c.; MÅ! SDM, MH!); Pargas (SBJ l.c.); 144 Nystad (SDM, MH!); Loimaa (MER, MÅ!). Ta region of Tammerfors, several localities, numerous at certain places (several collectors!). II. Kb Polvijärvi, 1 specimen (PHJ!). III. In the extreme northwest: "Torneå-Lappmark as far as 69°" (SBJ l.c.). Lk Muonio, May 31, 1867, 1 specimen (SBJ 1871b, p. 404; MH!); Kittilä (HLM; coll. STK).

Erroneous: Sa St Michel (EHN, MÅ; also in the map in LTH 1943c; = *plebeja*!).

*Russian sector:* Three localities in southern Karelia: Ko Petrosawodsk (PPP 1899a, p. 14; MH!). Kn Munosero (coll. SBJ, MÅ!). Sv Uslanka, 1943, 1 specimen (PFF!).

*Adjacent regions:* No records.

*Total area:* Palearctic species. Outside the region, in Europe, known to date only in Bohemia, Slovakia, and Poland (ROU 1930; HOR 1941, p. 256; "*kodymi*"). Eastern Siberia, Amur, 1 female (LTH 1943c).

### Ecology

Little is known about the mode of life† of this species, whose occurrence is sporadic and erratic. For the only locality, Ta Tammerfors, where the species is constant and occurring in higher numbers, GBL reports (in litt.): "Found on fairly dry, completely sun exposed places, where a marked, saturated humus layer occurs on moraine-gravel. Particularly recovered from rubbish heaps (garden compost). Successive species: *A. aulica*, *A. consularis*, *A. eurynota*, *A. municipalis*, *Harpalus aeneus*, and others." On Gtl, I found five specimens along a path, near Visby city, on gravelly soil with a quite thin humus layer and patches of tall synanthropic vegetation (*Arctium*, large *Rumex*, and similar plants). Moreover solitary specimens have been found in gardens (Skå Lund), sand pits (Vgl Borås), on black humus (Ögl Tåkern), on dry sandy humus (Ögl Alvastra), and the dry loamy edge of a field with *Cirsium arvense* (Upl Erken).

### Biology

The few southern Swedish (Skå-Hls) catches and specimens (within parentheses) can be divided as follows: IV: 1 (2); V: 5 (9); VI: 3 (4); VII: 0; VIII: 2 (2); IX: 2 (2); X: 2 (2); XI: 1 (1). An immature beetle was found on October 8, 1942 (Hls). Hibernates undoubtedly as an adult.

†(= bionomics; suppl. scient. edit.).



## Dynamics

Wings fully developed. The beetle is undoubtedly capable of flight but corroborative data absent.

## Systematics

After examining a female kindly sent by ROU from Prague (loc. class.) I was able to establish that *kodymi* Jedl. (*Cas. Csl. Sp. Ent.* 1936, p. 4; ROU, *Festschr. E. Strand.* V. 1939, p. 465) and *littorea* are identical.

\**Amara* (s. str.) *lucida* Dft.  
(*gemina* Zimm.)

## Distribution

*Sweden*: Pre-eminently a seashore species. The greatest distance from the sea where its recovery is certain (see below) is about 10 km: Skå Kävlings (THS, HM! coll. JNS! Roth, ML!). Moreover, apparently continuous in distribution along the southwestern as well as the southeastern coast; along the former north as far as Boh Kristineberg near Fiskebäckskil (leg. ?, MG!), June 1924, 5 specimens (LTH); Vgl Askim (SDN, 1 specimen, MG!) and Frölunda (NDN); Hll Släp (SDN, 3 specimens, MG!). On the east coast north as far as Små (BOH, RM! STH, MU! certainly Kalmar region); also numerous localities on Öd and Gtl, north as far as Fårön, Mjölner, September 30, 1927, 1 specimen (LOH, according to JNS).

Doubtful: Skå Ilstorp (MLG 1863, p. 27; no voucher specimen). This would have been the only actual report from the Swedish inland.

Erroneous: Upl (CDS 1873, p. 18).

*Norway*: A single locality in the extreme south: 5 Lyngdal (HMB; N.E.T. 1922, p. 119; MST 1927a, p. 294).

*Finland*: Only two widely separated localities: Ab Lojo, 1926, 1 specimen (KRG, N.E. 1935, p. 119!). Ik Metsäpirtti, 1 specimen (PME!).

*Russian sector*: Not recorded with certainty; however reported by GÜN from Gouv. Olonetsk (PPP 1899a, p. 4).

*Adjacent regions*: Widely distributed in Denmark, also on Bornholm, but not frequent (West 1940, p. 35). Not known from Estonia but found in Latvia ("Curland," SDL 1872, 1891), Pope (LCK and MIK 1939). Also in northern Poland (OGI 1931, p. 29). Not known from Leningrad region, as far as I could ascertain. British Isles (Joy 1932, p. 361), also Ireland (JHS and HLB 1902, p. 575).

*Total area*: Western Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 153), Corsica (DEV 1935, p. 46), southern Italy including Sardinia (LUI 1929, p. 108), Greece (OTZ 1886, p. 210). East as far as Kazan

- 146 (JAC 1905–1908, p. 358). Asia Minor (according to CKI 1927–1933, p. 419), Iran (BOD 1927c, p. 51), the Caucasus (CHD 1846, p. 160; SDR and LDR 1878, p. 72).

### Ecology

Found only in our coastal regions, on more or less dry, sun exposed, sandy soil with low and often quite sparse vegetation consisting of grass. Also found just next to the sea under stacks of old, dried seaweed. On Öd and Gtl also on “Alvar†” soil rich in grass. Sometimes together with *familiaris*. Usually somewhat buried in sand. The record of a single specimen from the inland near Ab Lojo was certainly coincidental. In other regions the species is consistently recorded as dependent on sandy places (JSH, F.F. 1900, p. 103; West 1940, p. 35; Dahl 1928, p. 142; NBG 1929, p. 124; GRD 1937, p. 16; FWL 1887, p. 78). On the British Isles mainly on the coast (FWL l.c.); in Germany partly frequent at the North Sea (HOR 1941, p. 259), and in northern Germany occurs particularly in fields and is in no way restricted to the coast (Dahl l.c.; GRD l.c.).

### Biology

The few Swedish catches are distributed as follows: III: 1; IV: 0; V: 12; VI: 14; VII: 6; VIII: 7; IX: 2. In Denmark (LRS 1939, p. 336) maximum abundance in May, and two larvae observed at the beginning of August. Numerous immature beetles found in Skå in August (August 8, August 21), on Gtl in July (July 19, July 27) but strangely also 2 specimens on June 17, 1934 (LOH!). At any rate the species might normally breed in spring, and hibernate as an adult.

### Dynamics

Wings fully developed. Insect undoubtedly with flight capacity but corroborative data absent.

\**Amara* (s. str.) *lunicollis* Schiø.  
(*vulgaris* auct. nec Thoms.)

Distribution  
(map in BCH 1938, no. 48)

*Sweden*: Distributed in every province except Mdp, and probably continuous even though rather erratic throughout the country, except for the true fjeld regions. Its absence from the east coast between Kalmar and Norrköping might

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

147 only be apparent. The highest or northernmost localities are: Dlr Särna (AND, LF!); Hjd Tännadalen (BRK!); Jtl Enafors (leg. ? MG!); Jorm (JNS and Palm, E.T. 1936, p. 184); Åsl Dorotea and Vilhelmina (LTH); Lyl Sorsele (GTZ, E.T. 1932, p. 53!); Lul Jockmock, July 1924, 4 specimens (LTH); Murjek, May 25, 1941 (RDB, ML!); Pålkem, 1940–1942, several specimens (WRN, LTH); Nbt Narken, July 27, 1938, 2 specimens (LTH). There are two localities on the Torneträsk adjoining the Norwegian area: Abisko, July 14, 1 specimen; Pålnoviken, July 18, 1939, 1 specimen (LTH).

*Norway:* Not frequent but rather uniformly distributed almost throughout the country. However not found in the true fjeld regions, nor on the peninsulas of the extreme north and southern Varanger. Highest southern localities: 22 Mjösavatn, Fauske in Hemsedal (STE, MB!); 12 Biri; 25 Aursund, 27 Rennebu in Orkedal. Northernmost localities: 35 Skjervøy (SPS); 37 Öks Fjord (SPS); 38 Lakselv in Porsanger (JEN according to STA).

*Finland:* South of about latitude 68° N distributed almost throughout the country, rather unevenly but certainly without gaps; especially frequent in the southeast. Northernmost localities: Ob Pello (MHJ, coll. GBL); Kemijärvi (STN!); Ks Salla (ENW, MH! STN!); Lk Pelkosenniemi (ELF); Sodankylä (SUD, MH!); Kittilä (SAD, MH! KRG! HLL!). Isolated near Lp Parkkino, July 1929, 2 specimens (LBÅ!).

*Russian sector:* Several localities on the Swir (several collectors!). Also near Ko Petrosavodsk (PPP 1899a, p. 15; MH!).

*Adjacent regions:* Widely distributed in Denmark, also on Bornholm, but not frequent (West 1940, p. 33). Estonia (SDL 1872; HAB in litt.; Palm!) and Latvia (LCK and MIK 1939). Leningrad region (MAS 1902, p. xxxi). British Isles (Joy 1932, p. 361), also Ireland (JHS and HLB 1902, p. 575). Shetland (West 1930, p. 75).

*Total area:* Palearctic species. In Europe found south as far as northern Spain (FUE 1920, p. 152), northern Italy (LUI 1929, p. 107), Bulgaria (APF 1904, p. 299). Iran (BOD 1927c, p. 52). The Caucasus (JAC 1905–1908, p. 357). Eastern Kirgizia (HEY 1896, p. 15). Siberia, east as far as Lena region (HEY 1880–1881, p. 37; PPP 1906b, p. 47) and Kamchatka (BNN, NET, SBR 1929, p. 4; WUO! MH!).

### Ecology

148 Rather eurytopic species, with lower requirements for dryness and sunshine than most other species of *Amara*. Generally occurs on markedly humus or peaty soil, for example in cultivated moors; also in sparse forests, e.g., under moss or rich vegetation of grass or herbs. In no way shy of culture it often lives under hay and straw in barns. Usually solitary, sometimes buried in the soil. Also in Central Europe often in sparse forests (Dahl 1928, p. 139; GRD 1937, p. 46), but also in heaths, for example, among *Calluna* (West 1940,



p. 34; E.B. 1911, p. 18; 1913, p. 260). LRS's conjecture (1939, p. 405) that the species inhabits drier places than *communis*, does not accord with my experience.

### Biology

Southern Swedish catches: IV: 8; V: 37; VI: 63; VII: 12; VIII: 5; IX: 8. In Denmark maximum abundance in May; larvae observed from end of July to September (LRS 1939, p. 335). I have seen immature beetles in central and northern Sweden only between July 19 (Lyl) and September 12 (Dir), September 28 (Vbt). The species is certainly a spring breeder and hibernates as an adult. The record of a larva in a mole nest (SLK, E.M. 1895, p. 114) is certainly a pure coincidence.

### Dynamics

Wings fully developed and certainly functional. Indications of flight capacity include the recovery of one specimen from snow at an altitude of 700 m above sea level, August 17, 1885, near Tromsö (SPS 1888–1889, p. 113; 1889, p. 214) and the comparatively numerous incidences in sea drift in Finland (Frey 1937, p. 437; PME 1944, p. 38).

*\*Amara (Bradytus) majuscula* Chaud.

### Distribution

The distribution of this species is incompletely known to date because it was only recently recognized as different from *apricaria* (LBH, N.E. 1941, p. 144; LTH 1943a, p. 50).

*Sweden*: Skå Sandhammaren, several specimens (Palm!); Åhus, July 19, 1917 (WGR!); Ängelholm, July 25, 1943 (OSS, coll. LTH). Små Virestad, September 1928, 2 specimens (BRC!); Ryssby, May 23, 1923 (GTZ, coll. LTH); Ljungbystad, August 15, 1936 (LTH). Öld Mörbylånga, June 29, 1928 (JNS!). Gtl Farön, July 25, 1926 (OLS!); Sandön, 1 specimen (JNS!). Vgl Limmared, May 28, 1936 (LTH); Vänersborg, October 1943 (SVS!). Nke Kvismaren, May 1949 4, 1931, 2 specimens (WSL!). Ögl Tåkern, 2 specimens (Palm). Sdm Södertälje (BRC!). Stockholm, May 1923 (U. Bergström, coll. LDV!), Bergshamra, May 1944 (LDN). Vrm Ölme, Väner beach, June 13, 1936 (LTH). Absent from all older collections.

*Norway*: No records.

*Finland*: I. In the southwest: on four islands in Ålands Skärgård, first of all in 1939 (STK and LBG, N.E. 1941, p. 144); Ab Åbo, 1931, 3 specimens



(MER, MÅ!); NI Hangö, August 25, 1931 (HLL!); Tvärminne, 1938, 1939, 1 specimen each (PME!); Långskär (KAN, coll. STK); Helsinki, September 1939, 1 specimen (SUH!). II. Ik Metsäpirtti, July 1, 1934, 3 specimens (LBG!), June 19, 1936 (HLL!). Absent in all older collections.

*Russian sector:* Collected from six localities in Ko and Sv during 1942 and 1943: Petrosavodsk (KRV); Vitele (KNG!); Kuujärvi (KNG!); Uslanka (PFF!); immediately north of the mouth of the Swir, numerous (KRH, N.E. 1943, p. 163! PME! PFF!).

*Adjacent regions:* No records to date. Also not known from the Baltic States where the species ought not to be absent.

*Total area:* Palearctic species. In Europe, outside the region, to my knowledge sighted only in Bohemia (St Boreslav, 1941, Kult in litt.). In Siberia widely distributed: Yenisey region (SBJ 1880; p. 34; RM! JEN, MO!), eastern Siberia (PUZ 1866, p. 264; JAC 1905–1908, p. 361). Mongolia (JEN, MO!); Tibet; Manchuria; China (JAC l.c.). Possibly the “var. *major*” of *apricaria* from the Caucasus (SDR and LDR 1878, p. 74) and Armenia (CHD 1846, p. 160) belongs here.

### Ecology

The mode of life of this species is almost unknown. Except for finds on the seashore in Ål (N.E. 1941, p. 144), which were evidently coincidental, only solitary specimens have been collected and these only recently correctly identified. In many cases the species was collected together with the closely related *apricaria*, often from soil intensely subjected to the effects of culture, even in the center of the city (Vgl Vänersborg). Always in dry, generally sandy places.

### Biology

The few dated catches from Sweden and Finland are distributed rather uniformly over the summer months: V: 4; VI: 2; VII: 3; VIII: 2; IX: 1; X: 1. An immature beetle was observed near Stockholm in May 1923. It is therefore very probable that the species behaves like *apricaria* and hibernates, by and large, in the larval stage.

### Dynamics

Wings fully developed. Flight capacity must be assumed in view of its occurrence in large numbers on the sea in Ålands Skärgård, as well as the record of one specimen in sea drift (PME 1944, p. 38). The absence of this species from all older collections indicates late immigration from the east.

*\*Amara (s. str.) montivaga* Sturm

Distribution

**Sweden:** Exclusively found in western central Sweden and known only during the twentieth century. Vgl Falköping, June 5, 1936, at three places, altogether 9 specimens (LTH); Skövde, July 21, 1930 (ERL, coll. LTH); Billingen, July 27, 1936, several specimens (Palm!); Kinnekulle, June 1939, several specimens (JNS and WRN); Töreboda, 1907, 1 specimen (LBL, RM!). Dsl Ed, 1935, 1 specimen, May 1936, 3 specimens (SVS!), 1936, 1 specimen (OLS!). Nke Mullhyttemo, May 25, 1935 (JNS); Vintrosa, August 21, 1936 (JNS); Tysslinge Latorp, May 27, 1918 (JNS, E.T. 1921, p. 176!); Örebro, several records, the first specimen June 1904 (JNS, E.T. 1915, p. 204!). Vrm Arvika, Gränsjön, March 10, 1938 (EVK, coll. LTH). Dlr Hedemora (RGS!), June 7, 1935 (JNS!); Gustavs, Solvarbo, April 24, 1938 (KLF!); Falun, June 13, 1936 (KLF).

**Norway:** Except for a single locality, 6 Meling in Högs Fjord (MST 1927a, p. 288), found within a limited region in the extreme southeast, but then in several localities. The first record appeared already around 1870. 1 Halden, around 1870 (HLS 1914, p. 3), 1908–1915 and 1922–1924, numerous (HSS; MST l.c.); Idd and Skjeberg, 2 Oslo region, several localities since 1908, particularly common 1925–1926 (MST l.c.!); 3 Larvik. 15 Kongsberg, around 1885, 1 specimen (MST l.c.).

**Finland:** In the southern half of the country widely and continuously distributed, but does not reach the west coast. Delimiting localities west and north: Ab Karislojo (SBJ, MH! KRG!); Ta Tammerfors region, several localities (several collectors!); Oa Seinäjoki (PHJ); Sb Iisalmi (STK); Kuopio (several collectors!); Kb Juuka, 1940 (KRG!). Easternmost locality: Kl Salmis (PFF!). Contrary to the situation in Scandinavia, this species is represented from Finland in older collections also (SBJ 1873, p. 111).

**Russian sector:** Strangely, no record to date.

- 151 **Adjacent regions:** Absent in Denmark. Also missing in the Baltic States and, as far as I know, hitherto not known from Leningrad region; however, I examined two specimens collected near Lempaala by PHJ, 1943.

**Total area:** Palearctic species. In Europe south as far as southern France (DEV 1935, p. 46), northern Italy (LUI 1929, p. 106), Bosnia (APF 1904, p. 299), Transylvania (PTI 1912, p. 29), Crimea (JAC 1905–1908, p. 356). The Caucasus (JAC l.c.; ECH 1930b, p. 217). Eastern Kirgizia (HEY 1893, p. 22). Western Turkestan (HEY 1896, p. 15). In Siberia, Trans-Baikal, only subsp. *violacea* Motsch. (LSH, *Revue Russe Ent.* 1914, p. 441).

Ecology

On stony soil in open, sun exposed places, preferably on southern slopes (evidently heat-requiring; according to MST l.c., in Norway particularly numerous

during warm years). Soil must be well drained and quite dry on the surface, with sparse vegetation consisting of grass or herbs, and usually (always ?) with an admixture of loam. The species is predominantly synanthropic in Scandinavia (also see MST 1927a, p. 288) and has been found even in the center of the city. A requirement for limestone is very likely since the species to date has been somewhat more frequent only in limy regions near Oslo, in Vgl and Nke; also recorded by Dahl (1928, p. 137) from Germany. In Central Europe, partly montane regions (RTT 1908, p. 161; HOR 1941, p. 254), and partly synanthropic as with us (JEA 1941–1942, p. 911). Records to the contrary are: “missing from sandy soil” (ROG 1856, p. 17) and “en terrain sablonneux” (JEA l.c.). One observation (pertaining to southern Germany) is peculiar: “appears to prefer humidity more than all other species of *Amara*” (Wolf 1936, p. 263).

### Biology

Distribution of the few Swedish catches: III: 1; IV: 1; V: 3; VI: 13; VII: 3; VIII: 2. Hence a prominent early summer insect. Numerous immature beetles July 27, 1936 (Vgl Billingen). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Spontaneous flight of one specimen observed near Nl Åggelby (KNG!). MST (1927a, p. 288) believes the species has come to Norway only recently (possibly through commerce).

152

\**Amara (Celia) municipalis* Dft.  
(*melancholica* Schiøf.)

### Distribution

Due to earlier confusion with *cursitans*, this species is incompletely known, and only for the southern parts of the region.

*Sweden:* From southern Sweden (Skå–Dlr) only such localities have been mentioned for which I have checked voucher specimens. Probably the species is widely distributed here in the plain, but highly localized; it appears to be absent in the southern Swedish highland. The gaps to date in southern Skå as far as Ble, and on the east coast between Små Kalmar and Stockholm are conspicuous; these might well be connected in the future. In the north from Hls as far as the Finnish border, apparently continuous in distribution, but does not reach the fjeld regions. Highest localities: Jtl Bräcke, Mordviken, 1936 (LTH); Ulriksfors, 1936 (LTH); Ång Hoting, 1936 (LTH); Åsl Dorotea and Vilhelmina, 1936 (LTH); Lyl Sorsele, 1910 (GTZ, E.T. 1932, p. 52!); Pil Arvidsjaur, 1925 (LTH); Nbt Harads, 1938 (LTH); Pajala, 1938, several



specimens (LTH); Tol Vittangi, July 29, 1938, 1 specimen (LTH). All definite records north of latitude 62° N made in the present century.

Doubtful: "Lappl." (BOH according to GLL 1896; no voucher specimen).

*Norway*: In the southeast several localities, west along the coast as far as 3 Fredriksvern (MST, MO!) and 4 Kragerö; according to MST (1927a, p. 295) also near 6 Jäären, Sole; north as far as 1 Lillestrømmen (MST, MO!). Isolated near 24 Lom (MST l.c.) and Sörem in Vågå (N.E.T. 1923, p. 256; MO!).

*Finland*: In the south widely but irregularly distributed, with a gap (probably not actual) between Helsinki (several collectors!) and Ka Viborg (MER, MÅ!); also in Al Eckerö (MER, MÅ!); north as far as Ta Tammerfors region (several collectors!) and Kl Sordavala (LNN, MÅ!). Farther north four widely separated localities: Oa Seinäjoki (PHJ!); Om Jakobstad (STÅ, according to HLL); Revonlahti (SDM, MH!); Ob Uleåborg (WUO, coll. LBG!).

*Russian sector*: Only near Lj Ponoj (ENW, MH! MÅ!).

*Adjacent regions*: In Denmark rather widely distributed (to date not found on Bornholm), but rare (West 1940, p. 35). Also found in Estonia (SDL 1872; and also Osel, HAB 1936a) and Leningrad region (OBT 1876), but to date not separated from *cursitans*.

153 *Total area*: Palearctic species. In Europe predominantly eastern species; absent in Holland, Belgium and the British Isles; south right into the Pyrenees (FUE 1920, p. 154), northern Italy (LUI 1929, p. 109), and Bulgaria (APF 1904, p. 302). In the northeast as far as Pechora (PPP 1907c, p. 309). The Caucasus (CHD 1846, p. 157; SDR and LDR 1878, p. 72). Western Siberia (SBJ 1880, p. 35; RM! WUO, MH!) and Lena region (HEY 1880–1881, p. 38). Possibly confused in part with *cursitans*.

### Ecology

More or less dry, preferably sandy-gravelly soil, with sparse often patchy vegetation. In southern Sweden in open fields or gravel pits. Similar incidence also reported from Central Europe, where the species has been found among *Artemisia campestris* (West 1940, p. 35) or on the roots of *Festuca* (PLZ 1938, p. 50; E.B. 1938, p. 94). Contrarily, in the more northern parts of the region the species is markedly synanthropic, occurring on farms, annexes, barns, railway embankments, etc., among weeds, usually together with *ingenua* (see discussion of *ingenua*), and often in city centers. Near Lj Ponoj in the *reg. alp.*, but definitely synanthropic (possibly transported accidentally); according to PPP (1910a, p. 317) purportedly also near Pechora in the Arctic region. Otherwise in Fennoscandia the species never reaches the *reg. bet.*

### Biology

Definite southern Swedish catches can be divided as follows: III: 2; IV: 3; V:



3; VI: 6; VII: 9; VIII: 2; IX: 12; X: 4. Numerous immature beetles found between June 15 (Hls) and July 28 (Nbt), but in southern Sweden only during June (June 18 to June 23). In this respect the species is identical with *cursitans*. I therefore assume, contrary to the opinion of LRS (1939, p. 408), that *municipalis* also hibernates at both the larval and the adult stages.

### Dynamics

Wings fully developed. Spontaneous flight of one beetle observed in Oslo (STA in litt.). In northern Sweden the species has apparently spread considerably in recent years.

### Systematics

Taxonomic relationship with *cursitans* discussed under the latter species.

154

\**Amara* (s. str.) *nigricornis* Thoms.  
(*melanocera* Tschitsch., *natvigi* Csiki; see LTH 1943a)

### Distribution

*Sweden*: Quite sporadic in occurrence. In older collections several specimens labeled "Lapland"; however only the following localities are definite: Dlr Idre (AND, 1 specimen, LF!). Hls Los, June 16, 1929 (SJB!); Ramsjö, July 1943 (LDN!). "Härjedalen," certainly Fjällnas region (GLL 1896, p. 22; 2 specimens, RM!). Jtl Revsund, May 9, 1943 (BGW!). Lyl Lycksele, June 25 (leg. ?, 1 specimen, coll. THS, MB!); Tärna, June 27, 1935 (RDB, ML!); Sorsele, two localities, May 23, 1919, July 20, 1931, June 30, 1932 (GTZ!). Lul Jockmock, August 14, 1924 (LTH); Ullatti, 1938, dead specimen (LTH). Tol Karesuando, two localities, June 18, 1930, June 1935, 3 specimens (BRC, RM!).

Erroneous: Hls Järvsö (JNS, E.T. 1921, p. 176; in his collection only *lunifrons* present!).

*Norway*: Very rare, only a few localities in the lower fjeld regions. 21 Sirdal (Tjötta, MV, det. MST). 11 Solli, Bretningen, July 27, 1904 (N.E.T. 1923, p. 255; MST 1927a, p. 291). 24 Skogseter (HSS, according to STA); Vålåsjö in Dovre, April 1938 (STA). 25 Röros (JEN, according to STA), Feragen, July 1887 (N.E.T., l.c.; MST l.c.). Large gap until: 32 Saltdal, two localities (SPS 1888–1889, p. 113; several collectors). 36 Nordmo in Målselv (MST). 38 Lakselv in Porsanger (JEN, according to STA). 41 southern Varanger, three localities (according to MST and STA).

*Finland*: Very rare, but in the north rather widely distributed. Ok Ruhtinassalmi (SSK, MÅ! coll. HLL!). Ks Paanajärvi (SBJ 1873, p. 112; MH!). Ob Turtola (KNG!). Lk Sodankylä (SUD, coll. LBG!); Kittilä (SAD, MH! SAA!). Li Ivalo (PFF, N.E. 1941, p. 76); Enare, Jankkila (PPP 1905, p. 97; MH!); Ut-

sjoki, Onnela, June 15, 1937 (NDM!). Lp Hietajärvi (PPP 1.c.); Saariselkä (PFF, N.E. 1942, p. 66!); Petsamo region (numerous collectors!), northernmost near Pummanki, July 10, 1939 (KRV!).

Doubtful: Muonio (SBJ 1871; not included in his 1873 work).

*Russian sector:* Seven widely separated localities in all parts of the Kola Peninsula (several collectors!), east as far as Lj Ponoj (PPP 1905, p. 97). Also on Solovetsk Island in the White Sea (LEV, MH!).

Doubtful: Kn Solomino (PPP 1899a, p. 15; no voucher specimen).

*Adjacent regions:* No records.

*Total area:* To date known only from Europe, where the species is boreo-  
 155 alpine in distribution. Outside the region found near Pechora, Ustj-Zylma, August 5, 1904, 1 specimen (PPP 1907c, p. 309). Recently reported by JEA (1941–1942, p. 918), 2 specimens, from France (Cevennen); I examined one male (Paris Museum!). The report from western Siberia (SBJ 1880, p. 36) is wrong (LTH 1941, p. 435).

### Ecology

Information on the mode of life of this species is scant due to the fact that it is rare and appears only singly. It seems to be an insect of the high boreal forest region and hence in contrast to almost all other species of *Amara*, decidedly is not favored by culture; the species was apparently more frequent in the last century, at least in Sweden. It is reported for more or less dry turf soil (SPS 1912, p. 167; PPP 1905, p. 97); in northern Norway, among others, found on gravelly soil together with *Hypnoidus hyperboreus* Gyll. (STA in litt.). In Sweden found many times on open forest soil, also under bark of pine. In the *reg. alp.* solitary specimens have been sighted: southern Norway (STA in litt.); Lp Lutto (PFF 1942, pp. 49, 66); Lj Ponoj (PPP 1905, p. 17; 1910a, p. 317).

### Biology

The very few dated catches from Sweden can be divided as follows: V: 2; VI: 7; VII: 1; VIII: 1. It therefore seems to be a spring breeder and would thus probably hibernate as an adult.

### Dynamics

Wings fully developed and certainly functional, but no flight observations available.

\**Amara* (s. str.) *nitida* Sturm.  
(*formosa* Schiøf., *güntheri* J. Sahlb. 1900a, p. 4)

### Distribution

*Sweden*: Generally rare, and distribution lacks continuity. Occurs principally in the eastern part of the southern half of the country. North of latitude 60° N, westernmost or northernmost localities are: Dlr Ludvika (FRL! WSL!); Sil-  
156 vberg, Länsmansmyren (ELS!); Sundborn, Toxen (KLF!); Hls Kilafors (LTH); Färila (LBL, RM!); Los (SJB); Mdp Sundsvall (ADZ, LD!); Jtl Bräcke (LTH); Revsund and Hackås (BGW!); Östersund (FHL!); Frösön (LTH); Åre, 1941, 7 specimens (BGW!); Ragunda, 7 specimens (FRI, VA!). Isolated from the foregoing and far north: Nbt Över-Kalix, 2 specimens (ÅGR!).

*Norway*: Found only in the southern half of the country, sparsely but widely and apparently continuously distributed. Not found on the coast in the extreme south and between Sogn and Trondheim. Northernmost localities: 7 Bergen, June 10, 1926 (LTH); 19 Lyster in Sogn (STA!); 13 Sel (STA!); finally three localities in Trondheim region (N.E.T. 1937, p. 146).

*Finland*: In the entire southern half of the country widely and continuously distributed, and not found to date only on the southwestern coast between Ab Uskela (MKL, MH!) and Oa Vasa, Korsholm (RDL, det. HLL). Becomes scarcer toward the north; northernmost localities: Ok Säräisniemi and Ob Uleåborg (WUO 1910, p. 64); Ok Suomussalmi (CRP!), Ruhtinassalmi (SSK, MÅ!); Ob Kemi (EHN, 2 specimens, MA!). On Åland only two localities: Jomala (HLL); Marienamn (HLM, coll. STK).

*Russian sector*: In southern Karelia several localities (several collectors!), north as far as Kn Karhumäki, 1942 (CRP!).

*Adjacent regions*: In Denmark rare and poorly distributed, found in Jylland and in one locality each on Falster and Sjaælland (West 1940, p. 33). Estonia (HAB in litt.) and Latvia (SDL 1872, 1891; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 360).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 152), Corsica (DEV 1935, p. 46), central Italy (LUI 1929, p. 106), Bulgaria (APF 1904, p. 299). Kirgizia (HEY 1893, p. 22). Western Siberia (SBJ 1880, p. 36); Trans-Baikal (HEY 1880–1881, p. 37).

### Ecology

On open, not completely dry gravelly soil, often with an admixture of loam. It tolerates moderate shade of shrubs or solitary deciduous trees. Found among others in gravel pits, but also occurs on totally plane regions. Distinctly favored by culture in the vicinity of Stockholm and Uppsala, probably because of the well-drained soil, and appears even on roads together with *Harpalus distinguendus*. Sometimes also found together with *ovata*. Frequently found



among grass roots and moss between small stones. Always solitary.

157

### Biology

Swedish catches (Skå-Jtl): III: 1; IV: 8; V: 23; VI: 17; VII: 7; VIII: 1; IX: 2. Immature beetles, July 28 (Jtl) and August 22 (Hls), but also on May 26, 1941 (Ögl Kärna, LOH!). In spite of this I believe LRS (1939, p. 405) is correct in assuming that the species normally hibernates as an adult.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### Variation

One inconsequential variety, *imbella* Reitt. (characterized by the absence of a pore at the base of each elytron). More frequent in the region than *forma typica* but not geographically restricted. Sometimes pore present on just one side.

\**Amara* (s. str.) *ovata* Fbr.

(*obsoleta* Dej., *sarsi* Munst., *curvicrus* Thoms. p. p.)

### Distribution

*Sweden*: Very unevenly distributed, but found almost throughout the country except for the true fjeld regions. Apparently absent in the southern Swedish highlands. Uncertain whether its occurrence in large numbers in Nbt is continuous with the southern area. Highest or northernmost localities are: Dlr Idre, 1925 (Sthen, coll. FRL!); Jtl Berg, 1943 (LDN); Hackås, 1942 (BGW!); Östersund, 1931 (FHL!); Frösön, 1936, frequent (LTH); Åre, 1941, 1 specimen (BGW!); Ulriksfors, 1936, 2 specimens (LTH); Vbt Hällnäs, 1936 (LTH); Åsl Dorotea, 1936 (LTH); Lyl Sorsele, Vallnäs, 1928, 1 specimen (GTZ, E.T. 1932, p. 53!); Nbt Harads, 1938, 1 specimen (LTH); Edeforsen, 1935, 1 specimen (SDH!), 1938, 2 specimens (LTH); Över-Kalix (ÅGR!); Karl-Gustav, 1941 (SJB); Lul Pålkem, August 14, 1940, 2 specimens (LTH).

*Norway*: Found partly in the coastal regions of the south, as well as in a small region north of the Polar Circle. 2 Oslo region; 5, four localities, east as far as Kristiansand, 6 Jæren, Hinna; Tau and Nedstrand in Ryfylke (HLS 1915, p. 27); 7 Sunde in Søndhordland; Bergen, 1926 (LTH). 32 Saltdal, two localities (SPS 1888–1889, p. 113; MST 1927a, p. 287, "*sarsi*"). Most of the localities published by MST (1927a, p. 286).

158 *Finland*: South of about latitude 65° N widely and continuously, but rather



unevenly, distributed; on the west coast not found between Åbo (several collectors!) and Oa Vasa (LGB, coll. STK). Northernmost localities: Ob Kemi (EHN, MÅ!); Lk Kairila (STN); Sodankylä (SUD, MH!); Ok Ruhtinassalmi (SSK, several collectors!). Not found on Åland proper, but contrarily found on Kökar (HLL!).

*Russian sector:* One locality on the southern coast of Kola Peninsula: Lm Umba (PPP 1905, p. 97, "*similata*"; MH!). In southern Karelia five localities, north as far as Kn Tolvaja (PPP 1899a, p. 15).

*Adjacent regions:* Widely distributed in Denmark, also on Bornholm, but not frequent (West 1940, p. 33). Estonia (HAB in litt.) and Latvia (SDL 1872; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360), also Ireland (JHS and HLB 1902, p. 574).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 151), Corsica (DEV 1935, p. 46), southern Italy including Sardinia, Sicily (LUI 1929, p. 106), Greece (OTZ 1886, p. 210). Northeast as far as Arkhangel'sk (Frey, MH!). Asia Minor (APF 1904, p. 299). Iran (BOD 1927c, p. 50). The Caucasus (SDR and LDR 1878, p. 71). Siberia (HEY 1880–1881, p. 37), east as far as Amur (HEY 1893, p. 22). Japan (according to CKI 1927–1933, p. 424).

### Ecology

On dry, open, gravelly ground, usually on southern slopes, often with some admixture of sand or loam. In sparse but tall vegetation of grass or herbs (especially Cruciferae), which often has a marked synanthropic character. Frequently in gravel pits and especially on railway embankments; even on city roads, and in general very much favored by culture. In Germany a preference for "lighter" soil has also been observed (NBG 1933, p. 56).

### Biology

Southern Swedish catches (Skå-Hls): IV: 11; V: 29; VI: 27; VII: 10; VIII: 1; IX: 3; X: 1. Distinctly a spring insect. I have seen immature beetles only in northern Sweden from July 27 (Jtl) to August 14 (Lul). Hibernation undoubtedly occurs in the adult stage. According to various observations, the species feeds predominantly on vegetables: *Alliaria*, flowers and pods (BLK 1925, p. 27); *Barbarea vulgaris*, young pods (Upl Forsmark, June 26, 1936, LTH); *Brassica* pods, seeds of *Reseda luteola*, and fruits of *Cynosurus* (KTT 1873–1874, p. 62). It also kills and consumes other beetles (KTT l.c.), and according to BLK (l.c.) the larva is carnivorous.

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*Amara (Cyrtonotus) peregrina* Mor.  
(*tumida* Popp. nec Mor., according to Hellén, N.E.  
1930, p. 6; *Harpalus simulans* J. Sahlb.)

## Distribution

*Russian sector*: Found only in two localities in the western part of Kola Peninsula. Lt Kola (PPP, 1 specimen, MH!); Lu Voroninsk, June 1887, 1 specimen (SBJ 1872, p. 153; PPP 1905, p. 95; MH!).

Absent in the rest of Fennoscandia and in adjacent regions.

*Total area*: Palearctic species. In Europe not known to date outside the region. Siberia (among others, SBJ 1880, p. 44; TTR, H.E.R. 1893, p. 370; 1894, p. 390), east at least as far as Trans-Baikal (JAC 1905–1908, p. 362). Northern Mongolia (HEY 1896, p. 15; JAC l.c.).

## Ecology

In Asia the species occurs exclusively in forest regions and is thus absent in the tundra (PPP 1910a, p. 320). To the best of my knowledge its mode of life is otherwise unknown.

## Dynamics

Wings fully developed (in the type specimen "*Harpalus simulans*" from Siberia; RM!) and possibly functional.

\**Amara (Triaena, Zezea) plebeja* Gyll.

## Distribution

*Sweden*: Found throughout the southern and central parts of the country, although somewhat irregularly distributed (especially frequent in western central Sweden), but continuously distributed along the Gulf of Bothnia until the border with Finland. Highest or northernmost localities are: Dlr Särna (AND, LF!); "Jämtl." (certainly Åre region; AUR, RM!); Revsund (BGW!); Ragunda (FRI, VA!); Jorm, 1932, 1 specimen (JNS and Palm, E.T. 1936, p. 184); Ång Hoting, 1936, 2 specimens (LTH); Tåsjö, 1939, 1 specimen (BRC, RM!); Åsl Dorotea, 1936, 7 specimens (LTH); Vbt Degerfors, 1935, 2 specimens (FRL!); Vindeln, 1930, 1 specimen (LTH and Palm, 1934, p. 39!); Bureå, 1936, 6 specimens (LTH); Nbt Älvsbyn, 1930, 1 specimen (LTH and Palm, l.c.!); Edeforsen,

1938, 1 specimen (LTH); Karungi, 1930, 1 specimen (LTH and Palm, l.c.), 1941 (SJB); Lul Pålkem, July 8, 1941, 1 specimen (WRN!).

Doubtful: Lul Jockmock, June 1843 (BOH, manuscript in K.V. Ak., no voucher specimen).

*Norway:* South of the Polar Circle widely and continuously distributed, and apparently also without gaps except for the true fjeld regions. Highest southern localities: 16 Vestfjorddal (HLS 1891a, p. 15); 23 Grindaheim in Valdres (MST 1927a, p. 285); Dovre, Kirkestuen, numerous (MST l.c.). Northernmost localities: 30 Grong (MST l.c.); 31 Mosjøen (LYS, according to STA); 32 Mo; Ramnå; Bjällånes (NTV: STA).

*Finland:* South of but near latitude 64° N universally distributed. Delimiting localities: Om Jakobstad (SBJ, MH!); Vetil (NSL); Kb Nurmes (ENW, MH!). Farther north only three localities: Om Revonlahti (PME); Ob Hailuoto (WUO, MH!); Lk Kairila, 1937, 1 specimen (STN!).

*Russian sector:* Only in southern Karelia, numerous localities (several collectors!), north as far as Kn Semsjärvi, 1942 (CRP!).

*Adjacent regions:* Widely distributed in Denmark, also on Bornholm, but not frequent (West 1940, p. 33). Estonia, including Ösel (HAB 1936a); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 359), also Ireland (JHS and HLB 1902, p. 575).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 151), northern Italy (LUI 1929, p. 105), Serbia (APF 1904, p. 98). Siberia (among others, SBJ 1880, p. 37; JEN, MO!), east as far as Vladivostok (WUO, MH!). Northern Mongolia (JEN, MO!).

### Ecology

Usually on more moist soil than the other species of *Amara* (except *famelica*) but otherwise fairly eurytopic. Particularly numerous in the upper, more elevated parts of lakesides, with more or less dense but not too tall vegetation  
 161 of *Carex* or grass, sometimes together with *Anisodactylus binotatus*. Also on fairly moist soil in meadows or among weeds on fallow land, frequently together with *familiaris* and other species. A slight admixture of loam in the soil seems necessary; otherwise also found on sand, gravel, humus, or peat. Always in open situations and, at most, with weak shade of *Salix* bushes and similar plants. Not particularly favored by culture. In Central Europe the eurytopic nature of the species has been emphasized (Dahl 1928, p. 130; GRD 1937, p. 44), but likewise its contrary occurrence in humid places such as shores (Dahl l.c.), or peat bogs (ROU 1934, p. 76).

### Biology

Southern Swedish catches: III: 1; IV: 10; V: 35; VI: 98; VII: 56; VIII: 16; IX: 8;



X: 2; XI: 1; XII: 1. Numerous immature beetles found in August and September, the earliest on August 15 (Nbt). In Denmark two larvae were sighted at the end of July (LRS 1939, p. 334). Spring breeder; adults hibernate. The beetle is "principally phytophagous (especially seeds) and only occasionally carnivorous" (ZPT 1931, p. 398); it has, for example, been found "in panicles of *Poa* and *Festuca* species," also on cereals (LTZ 1847-1852, p. 255), and in large numbers both in Denmark on *Alopecurus geniculatus* (West 1940, p. 33) and in Finland on *Deschampsia caespitosa* (NDM 1944, p. 26). Also observed feeding spontaneously on the larvae of *Contarinia* and *Phytomyza* (NOT 1943, p. 36).

### Dynamics

Wings fully developed. Spontaneous flight observed near Dlr Ludvika on June 11, 1922 (FRL!) and in Germany (HOR; NBG). In Finland found in large numbers in sea drift (Frey, 1937, p. 437; STÅ 1938, p. 19; PME 1944, p. 38).

\**Amara (Celia) praetermissa* C.R. Sahlb.  
(*rufocincta* C.R. Sahlb.)

### Distribution

162 *Sweden*: Found in all provinces except for Gst and Mdp. Distinct separation, however, between the northern and southern stock, with a distinct gap in distribution north of latitude 60° N. Delimiting localities toward the north: Vrm Höje, 1933, 1 specimen (Paim and LTH 1937, p. 119!); Dlr Norrbärke, Vanbo, July 20, 1936, 1 specimen (KLF!); Upl Dannemora, June 26, 1936, 1 specimen (LTH). North of the distribution gap, the delimiting localities are: Dlr Särna (AND, MG! LF!); Hls<sup>5</sup> Delsbo, 2 specimens (RUD, MG!); Iggesund, July 3, 1936, numerous (LTH); Jtl Frösön, 1936, 4 specimens (LTH); Ång Hoting, 1936, 1 specimen (LTH); Vbt Umeå (GTZ). In the fjelds the species is widely distributed and in part not very rare.

*Norway*: In the south widely distributed, particularly in the fjelds, but also in the coastal regions, west as far as 6 Rennesøy. Northernmost localities: 23 Dovre, Hjerkin; 25 Røros; in addition, near Trondheim (LYS, N.E.T. 1937, p. 146; 1 specimen, MD!). In the north widely and apparently continuously distributed as far as southern Varanger (although there is only one locality here: Kjelmøy). Southernmost localities of the northern area: 30 Klovimoen in Vefsn; Skarmodal; Hattfjelldal (STE, MO!).

*Finland*: The distribution is highly split and can be divided (at least provisionally) into three subareas: I. In the southwest, including Åland (four localities; PFF! LBG!), rare. Delimiting localities: Ab Villnäs (MNH, MH!); Lojo

<sup>5</sup>Both localities in Hls, according to the history of immigration of the species, might belong to the southern stock.



and Karislojo (several collectors!); NI Helsing (Charpentier, MH!). II. In the southeast, delimiting localities: Sa Kristina (RNK); St Michel (EHN, MH!); KI Impilahti (SBJ 1873, p. 108; MH!). It is not certain whether this area is connected with the localities in Sb and Kb, southernmost near Sb Tuovilanlahti (SBJ l.c.) and Nilsä (LEV, MH! coll. LBG!). III. In the north, scattered but probably continuously distributed, on the west coast south as far as Ob Uleåborg (SBJ l.c.).

*Russian sector:* I. Along the northern coast of the Kola Peninsula, east as far as Lj Ponoj (PPP 1905, p. 96; MH!) in the interior, Lt on the Tuuloma River (PPP l.c.; MH!). Also near Lm Kantalaks (PPP l.c.). II. Three localities in southern Karelia: Kn Petrosavodsk (PPP 1899a, p. 14); Sv, just north of the mouth of the Swir, 1942 (KRH! Aftén, coll. HLQ!); Uslanka, 1943 (PFF!).

*Adjacent regions:* In Denmark rare, predominantly in Jylland; additionally only on Falster, Møen and Bornholm (West 1940, p. 36). Estonia (SDL 1872; HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 359), also Ireland (JHS and HLB 1902, p. 574).

163 *Total area:* Palearctic species. In Europe as far as Massif Central (DEV 1935, p. 47), Pyrenees (FUE 1920, p. 155), central Italy (montane; LUI 1929, p. 109), Bosnia and Bulgaria (APF 1904, p. 303). In the northeast as far as Kanin (PPP 1909, p. 7) and Pechora (SBJ 1898, p. 339). The Caucasus (CHD 1846, p. 158; SDR and LDR 1878, p. 73). Siberia (among others, SBJ 1880, p. 38; RM! JEN, MO!), east as far as Kamchatka (WUO, MH!). Northern Mongolia (JEN, MO!).

### Ecology

The mode of life is particularly reminiscent of *brunnea*, with which it is often found together, as well as in the *reg. alp.* of the fjelds and farther south under foliage in sparser forest stands. Both species definitely prefer gravelly soil (moraine or glacial rubble). *A. praetermissa* is in no way restricted, however, to deciduous forest, and is found as often in quite open, always dry gravelly beds or gravel pits. In the south it distinctly prefers the coastal regions, and is sometimes frequent in the central Swedish glacial rubble ridges (Swedish rullstensås). In the *reg. alp.* of the fjelds it always lives on more or less dry, usually sparsely overgrown moraines, normally only up to about 800 m above sea level (Hjd, Lyl, Pil, Lul, Tol); also found in the *reg. alp.* of Norway (SPS 1888–1889, p. 112; 1910a, p. 76; STA in litt.), Finland (LBÅ 1927, p. 19), Kola Peninsula (PPP 1910a, p. 319), and on Kanin (PPP 1909, p. 7). The preference for limestone mentioned in England (FWL 1887, p. 72) is not confirmed by our records.

## Biology

Southern Swedish catches: IV: 3; V: 7; VI: 24; VII: 28; VIII: 15; IX: 5. Numerous immature beetles in southern Sweden from June 3 (Skå), June 19 (Vst) up to July 22 (Sdm), but contrarily in the fjelds of Lapland between August 5 and September 13. In the south the species does indeed hibernate in the larval stage, as assumed by LRS (1939, p. 409) for Denmark, and confirmed by my several finds of dead beetles during late autumn near Upl Djursholm. In the fjelds, on the contrary, obviously the adults hibernate, possibly together with the larvae (two-year development?). Near Nbt Tärendö, July 1938, three beetles were seen feeding in the evening in the withered heads (certainly on the fruits) of *Solidago virgaurea*.

## Dynamics

Wings fully developed. Old observation on flight in Germany (S.E.Z. 1843, p. 90). Two specimens, which certainly strayed in flight, were found on a glacier in Tol Kebnekaise at an altitude of 1,300 to 1,500 m above sea level on July 12, 1941 (BGW!).

164

\**Amara (Celia) quenseli* Schönh.  
(including *silvicola* Zimm.)

## Distribution

*Sweden*: Found in the coastal regions, almost exclusively south (*f. silvicola*), and in the fjelds and northern Swedish forest region (*f. typica*). In the intervening parts extremely rare and sporadic, including the intermediate forms. True "*silvicola*" north as far as Hll Varberg, 1922 (LBÅ, E.T. 1924, p. 191; coll. LBG!); Gtl Sandön, August 1931, 3 specimens (LOH!). In addition to Ång, on the little island Råskärsön near Örnsköldsvik, July 8, 1936, numerous (LTH). Southernmost localities of the more or less distinct and true *quenseli*: Hll Släp (SDN, 1 specimen MG!); Vgl Norra-Fågelås, Systratorp, September 8, 1935, 1 specimen (LOH!); Vrm Fryksta, June 23, 1933, 1 specimen (LTH); Dlr Rättvik, 1943, 2 specimens (TJT!); Lima, July 1929, 1 specimen (OLS!); Upl Runmarö (HFS, 1 specimen, intermediate form, LÖ!); Gst Hamrånge, July 1, 1936, 1 specimen (LTH); Hls Delsbo (RUD, 2 specimens MG!); Jtl Bräcke, July 29, 1936, 1 specimen (LTH); Ragunda, Hammarstrand, August 8, 1942 (BGW).

Doubtful: Ögl Skanninge (Nerén, E.T. 1880, p. 156; "*silvicola*"). Vst Ängelsberg (DHG, E.T. 1911, p. 207; no voucher specimen).

Erroneous: Jtl Åreskutan (BRD 1934, p. 230; based on a wrongly identified specimen in coll. ZTT, ML!).

*Norway*: On the southern seashore, *f. silvicola* (MST 1927a, p. 296). 1 Hvaler, Kirkeoy (N.E.T. 1920, p. 60); 5 Risöbank near Mandal; Lister, Kviljo; 6 Orre and Kvalbein in Jæren (HLS 1915, p. 29). In the last named locality the "true" *quenseli* also occurs, which is distributed throughout the fjelds; on the other hand, in southern Norway only near 18 Tangerås in Strandebarin (SPS 1875, p. 21); 19 Årdalstangen in Sogn (MST l.c.); 28 Hell in Stjördal (N.E.T. 1937, p. 146). Widely distributed in the north (only *f. typica*), southernmost near 30 Hattfjelldal (STE, MO!); from 31 Bodö (SPS) onwards also on the coast. Northernmost locality: 37 Honningsvåg (MST, SPS).

*Finland*: Distribution highly split. I. Coasts (with considerable gaps) from Ob Torneå (LBÅ! STN!) to Ik Terijoki (KRG!) and Rajajoki (GBL), chiefly *f. silvicola*, even 1 specimen (along with typical *quenseli*) near Ob Uleåborg (WUO, coll. KRG!). Also on lake Ladoga the form *silvicola*: Ik Pyhäjärvi (LBG!); Ki Kexholm (SBJ 1871a, p. 333; MÅ!). II. Three isolated localities in the southern interior: Ta Tammerfors (KNG); Sa Taipalsaari (MKL, MH!); Kb Kontiolahti (KRG!). III. Farther north and at least north of the Polar Circle continuously distributed, south as far as Ok Ruhtinassalmi (SSK, MÅ!).

*Russian sector*: Along coast of entire Kola Peninsula, southwest as far as Lm Kantalaks (PPP 1905, p. 96; MH! MÅ!). Then near Kr Soroka (PPP 1899a, p. 14; MH!). Apparently absent in southern Karelia.

*Adjacent regions*: In Denmark only the *forma silvicola* occurs, which is found exclusively on the coast; rather widely distributed, also on Bornholm (West 1940, p. 34). In the western parts of Estonia including Runo (HAB in litt.), Latvia (LCK and MIK 1939), and Lithuania (MIK 1905). Leningrad region (OBT 1876). British Isles, only Scotland (Joy 1932, p. 361). Iceland (LTH 1931, p. 177).

*Total area*: The *forma typica* is Palearctic and in Europe boreo-alpine (HDH and LTH 1939, p. 145), south right into the Pyrenees (DEV 1935, p. 47), southern Alps, Montenegro, southern Karpathos, and Bulgaria. In the northeast as far as Kanin (PPP 1909, p. 7) and Pechora (PPP 1907c, p. 309). The Caucasus (CHD 1846, p. 158). Siberia (SBJ 1880, p. 38; RM! PPP 1907d, p. 18), east as far as Kamchatka (BNN, NET, SBR 1929, p. 4; WUO, MH!). The form *silvicola* is found only in the Baltic Sea region and in northern Central Europe, south as far as Holland and Belgium (EVS 1898, p. 81; 1922, p. 29), the Rhineland (HOR 1941, p. 265), Moravia (HOR l.c.).

### Ecology

Always on dry, open, usually quite unshaded sandy soil, which however often contains a notable admixture of gravel or stone. In the inland almost exclusively on moraines; on the coasts (*f. silvicola*) namely on shifting sand. Vegetation is always poor, usually with little continuity, and consists of grasses; in the fjelds also includes dwarf bushes such as *Salix herbacea*, *Cassiope hyp-*



*noides*; on shifting sand the vegetation consists of widely separated fascicles of *Psamma* or *Elymus*. Only in the Abisko region has the species been found in richly overgrown places such as *Trollius* meadows (BRD 1934, pp. 89, 229). In the *reg. alp.* found at an altitude of about 1,000 m above sea level (Tol; BRD l.c.). On the Kola Peninsula, in northern Russia, and the Siberian tundra (PPP 1910a, p. 318). Also everywhere outside the region, only on sandy soil, often found during the daytime among roots of *Artemisia campestris* (West 1940, p. 36), *Psamma* (NBG 1933, p. 54), and other grasses (LNZ 1857, p. 15; HSN, F.F. 1924, p. 35).

166

### Biology

All the dated Swedish collections can be divided as follows: IV: 1; V: 3; VI: 24; VII: 74; VIII: 32; IX: 7. In southern Sweden too maximum abundance is in July, but in Denmark (LRS 1939, p. 336) in June. Numerous immature beetles (from northern Sweden and Norway) during July, from July 8 (Ång) to July 21 (Åsl); in Denmark at the end of June (LRS l.c.). LRS (l.c., p. 407) assumes that the species breeds in spring and hibernates as an adult. It is however inconceivable that individuals which have freshly emerged on July 17 in Dovre or on July 12 in the Abisko region could originate from the brood of the same year. At least in northern Fennoscandia the species must hibernate in the larval stage (possibly a two-year development), and presumably also at least partly in the south. The beetle consumes vegetable food, e.g.: "capsules of *Wahlbergella affinis*" (Tol; BRD 1934, p. 230), in Iceland, the seeds of *Polygonum aviculare*, *Trisetum spicatum*, *Luzula multiflora*, and flowers of *Galium verum* and *Thymus serpyllum*, in the latter case consuming the hair of the mouth of the stem (LTH 1931, p. 178).

### Dynamics

Wings always fully developed in our region and certainly functional; flight data absent however. My experiments with exposure to sun and heat proved futile. In Finland one specimen was found in sea drift (Frey 1937, p. 437). In the Alps, according to HDH (in litt.) a brachypterous form has been detected.

### Systematics

The view that *quenseli* and *silvicola* cannot be separated as distinct species (LTH 1931, p. 178; KRG 1932, p. 190), nor even subspecies, is now generally recognized (HOR 1941, p. 265). In my opinion *silvicola* is only a modification of *quenseli* living on fine-grained sand, which exactly corresponds to the "*f. arenaria*" of *fulva*. During the summer of 1938 an attempt was made to propagate a number of specimens of typical *quenseli* from Abisko, on an is-



land of shifting sand near Nbt Luleå; the following summer not a single insect was recovered.

### Fossil Record

Skåne, late glacial (HNR 1933, p. 140).

167

\**Amara* (s. str.) *similata* Gyll.  
(*curvicrus* Thoms. p. p.)<sup>6</sup>

### Distribution

*Sweden*: In the southern and central parts widely, albeit irregularly distributed; frequent even in southern Dlr. Farther north far scarcer and found only in the twentieth century: Dlr Lima, Rörbäcksnäs (J.S. Dahl!); Transtrand, 1937 (RGS!); Idre, 1925 (E. Bergström, coll. FRL!). Hls Ljusne, 1936 (LTH); Färla, two localities, 1941, 1942 (LBL, RM!). Hjd Tännäs, June 29, 1936 (BRK!). Jtl Revsund, June 25, 1941 (BGW!); Ragunda, 2 specimens (FRI, VA!). Ång Undrom and Mo, Moliden, June 1939 (BRC, RM!); Örnköldsvik, July 9, 1936 (LTH). Vbt Hällnäs, Bodarna, April 21, 1935, June 25, 1937 (HEQ!).

Erroneous: Åsl Nästansjö (ZTT 1840, p. 34, = *communis*, ML!).

*Norway*: In the southeast widely distributed, west as far as 4 Nes, north as far as 12 Hamar (HLS 1891a, p. 14). Isolated in 6 Lindöya near Stavanger (MID) and 1 specimen in the vicinity of Bergen (SPS 1901, p. 42).

*Finland*: In the southern and central parts widely and continuously distributed, becoming rarer toward the north. The following localities lie north of latitude 63° N: Oa Replot (LBÄ); Sb Iisalmi (STK); Om Haapavesi (HEL, NL); Revonlahti (PME!); Ob Uleåborg (WUO 1910, p. 64).

Erroneous: "Lappl." (KLS, according to SBJ 1873, p. 111).

*Russian sector*: Only in Karelia (Sv, Kn, Kr), the northernmost near Lake Kr Wig (EDG, MH!).

Erroneous: Lm Umba (PPP 1905, p. 97, = *ovata*, MH!).

*Adjacent regions*: Widely distributed in Denmark, including Bornholm, and frequent (West 1940, p. 33). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884; HEY 1903). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 360), also Ireland (JHS and HLB 1902, p. 574).

*Total area*: Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 151), central Italy, Sardinia, Sicily (LUI 1929, p. 105), Bulgaria (APF 1904, p. 298). Northern Africa (according to CKI 1927–1933, p. 427). The Caucasus (CHD 1846, p. 159; SDR and LDR 1878, p. 71). Western Turkestan (HEY 1880–1881, p. 37). Siberia (among others, SBJ 1880,

<sup>6</sup>The synonymy of *curvicrus* remains uncertain. One of the original specimens in the Berlin Museum is a *similata* male (E.T. 1932, p. 225); a second specimen in the Lund Museum, likewise labeled "Norrl.," is contrarily a typical *ovata* male!

p. 36; RM! JEN, MO! WUO, MH!), east as far as Amur (BOD 1927b, p. 30) and Ussuri (MDL 1931, p. 5).

### Ecology

On sun exposed, moderately dry soil with rich markedly "weedy" vegetation, and hence greatly favored by culture. In meadows, fields (especially fallow land), farms, and barns. Soil conditions are almost irrelevant; found on loam, sand, peat, etc. This species tolerates shade and humidity better than *ovata* (also observed by NBG 1933, p. 56). Preference for cultivated land has also been observed in Finland (SBJ 1873, p. 111) and Germany (Dahl 1928, p. 137; GRD 1937, p. 44).

### Biology

Southern Swedish catches: II: 1; III: 6; IV: 23; V: 62; VI: 67; VII: 15; VIII: 20; IX: 6; X: 3; XI: 2. Immature beetles August 8 (Skå). Larvae from end of July to beginning of September (KMN 1912; LRS 1939, p. 335). Spring breeder, hibernating as an adult. Beetle definitely phytophagous and especially damaging to Cruciferae: flowers of *Barbarea vulgaris* (Små Ryssby, June 16, 1923, GTZ!) and *Capsella* (SDV 1847, p. 200), and seeds of *Capsella* (Stockholm, July 14, 1923, LTH); in Germany found in large numbers consuming the fruits of *Deschampsia flexuosa* (KLE, E.B. 1912, p. 282).

### Dynamics

Wings fully developed. One female was induced to flight upon exposure to sun in glass (Upl Djursholm, September 16, 1941). Observations on spontaneous flight: Dlr Sundborn, Karlsbyn, May 16, 1943 (TJB!); Hungary (HST, E.N. 1876, p. 79). Several specimens in sea drift in Finland (Frey 1937, p. 437; STÅ 1938, p. 19; PME 1944, p. 38).

### Fossil Record

Galicja, glacial (SCL 1916, p. 47).

*\*Amara* (s. str.) *spretta* Dej.

### Distribution

*Sweden*: Exclusively in the southwest and, except for four localities in Skå, found only along the seashore, where it is not infrequent at some places.  
 169 *Delimiting localities*: In the east: Skå Åhus, August 1908 (ROS, ML!). In the west: Hll Falkenberg (several collectors!); Tvååker (leg. ? MG!); Vgl Göteborg

(KLF! WIB, ML!), according to SDN (manuscript) near Nya Varvet, May 1868, collected by him and MRT (voucher specimens absent). Localities in the interior (Skå): Sjöbo, May 1886 (Roth, 12 specimens, ML!); Sandby (THS, MB! MLF, MG!); Övedskloster (BRK); Stehag, May 1880, 1 specimen; May 1885, 1 specimen (MLC, HM! coll. WLN!).

*Norway:* Only on the southern coast, in three widely separated regions: 1 Fredrikstad, May 10, 1896, 1 specimen (WOL, MO!). 5 Kristiansand (ULL, according to MST 1927a, p. 293). 6, several localities in Jæren (HLS 1915, p. 28).

*Finland:* Rare, only in the coastal region of the south, two separate areas: I. In the southwest: Ab Villnäs (MNH, according to SBJ 1873, p. 112; the specimen in MH is labeled "Åbo!"); Lojo, 1926, 1 specimen; NI Helsinki, 1 specimen, and Helsingē 1 specimen (KRG!). II. In the southeast: Ik Uusikirkko (STN!); Terijoki (several collectors!); Valkjärvi (KRG!); Metsäpirtti (HLL; HLM, coll. STK). Broad gap between these two subareas is indeed actual.

*Russian sector:* Only in southern Karelia on the banks of the Swir River and Lake Onega (PPP 1899a, p. 15), northernmost near Kn Velikaja-Guba (PPP, MH!).

*Adjacent regions:* In Denmark, including Bornholm, distribution rather wide but not frequent (West 1940, p. 34). Estonia, also on the northern coast (HAB in litt.) and on Ösel (HAB 1936a); Latvia (SDL 1872; ULN 1884; BRM 1930; LBÅ 1932). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 361).

*Total area:* Palearctic species. In Europe south as far as the Pyrenees (FUE 1920, p. 152), northern Italy (LUI, 1929, p. 107), Bosnia (according to HOR 1941, p. 256). In the northeast as far as Pechora (PPP 1907c, p. 309). The Caucasus (JAC 1905–1908, p. 358). Kirgizia (HEY 1880–1881, p. 37). Siberia (among others, SBJ 1880, p. 37; RM! JEN, MO! WUO, MH!), east as far as Amur (HEY l.c.; BOD 1927b, p. 78). Northern Mongolia (PPP 1907d, p. 17).

## Ecology

Always on dry sandy soil with sparse vegetation (e.g., grasses characteristic of sand dunes) or almost no vegetation; in Sweden (except for a few localities in Skå) and Norway (HLS 1915, p. 28) only on the sea, especially on shifting sand. It is strange that the species seems to be absent in the shifting sand regions of Finland (KRG 1932). It lives under stones, dry grass, etc. Also outside the region exclusively on sand, in Denmark particularly on sand dunes of the coasts (SDT 1870, p. 409; West 1940, p. 34); in the rest of Central Europe, however, occurs independent of proximity to the sea (W.E.Z. 1898, p. 251; E.B. 1920, p. 203; GRD 1937, p. 46).



## Biology

Distribution of the few Swedish catches: IV: 3; V: 17; VI: 17; VII: 12; VIII: 5; IX: 2; X: 1. In Denmark maximum abundance in June (LRS 1939, p. 336). Numerous immature beetles from July 15 to August 17 (Skå). Spring breeder, adults hibernate.

## Dynamics

Wings fully developed. Spontaneous flight observed many times in Germany (WGN and NBG, in litt.).

*\*Amara (s. str.) tibialis* Payk.

## Distribution

*Sweden*: In the south widely and continuously distributed and often frequent, especially in coastal regions. In central Sweden many more gaps: first and foremost still not known for a wide stretch of the east coast (in the provinces of Små, Ögl, Sdm), nor for Vst, Dsl, and large parts of Vrm. North of latitude 62° N occurrence sporadic and perhaps discontinuous. Northernmost localities: Vrm Vingång and Långflon (Palm and LTH 1937, p. 119!); Dlr Lima, 1941, 1 specimen (OLS!); Orsa, June 1908 (UYT 1909, p. 298, and in litt.), Fryksås, June 13, 1937, 1 specimen (TJB!); Hls Delsbo (RUD, 1 specimen, ML!); Forsa (leg. ?, 1 specimen, RM!); Hennan, June 23, 1943, 1 specimen (BGW); Mdp Njurunda, 1936, 1 specimen (LTH); Jtl Bispgården, July 1944 (KRG); Ång (leg. ?, 1 specimen, coll. GLL!); Mo, Moliden, June 1939, 2 specimens (BRC, RM!); Lyl Lycksele, June 1832, "copiose" (ZTT 1840, p. 36; 2 specimens, ML!); Nbt Harads, June 1938, 4 specimens (LTH); Karungi, 1930, 1 specimen (LTH and Palm, 1934, p. 40!).

*Norway*: Distribution markedly eastern and divided into two subareas. I. In the southeast numerous localities, west as far as 5 Lyngdal, north as far as 2 Vikesund (HLS 1891a, p. 14). II. In the central south: 13 Otta in Sel (MST 1927a, p. 294); Ringebu (SHY 1879, p. 19); 25 Røros (MST l.c.). 38, five localities in the Trondheim region, north as far as Tynes in Verdal, July 171 1840 (ZTT, ML! Also see N.E.T. 1923, p. 276; 1937, p. 146).

*Finland*: In the south widely and continuously distributed. The northern boundary forms an oblique line through the following localities: Ab Nystad (SDM, MH!); Ta Ruovesi (PME); Tb Jyväskylä (SBJ, MH! MER, MÅ!); Kb Polvijärvi (PHJ!). Farther north occurs in five localities, which appear to form a separate area (possibly continuous with the Swedish area): Om Pedersöre, Vestersundby, June 4, 1929 (STÅ); Revonlahti (PME); Ob Uleåborg (WUO 1910, p. 64; MH!); Ok Säräisniemi (WUO l.c.; MH! coll. LBG!); Kajana (HLL, MH!).



Doubtful: "Lappl." (SBF, according to SBJ 1873, p. 109; MH!).

*Russian sector:* Only in southern Karelia, four localities, north as far as Kn Karhumäki, 1942 (CRP!), 1943 (KRV).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 35). Estonia (HAB in litt.); Latvia (SDL 1872; BRM 1930; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 361), also Ireland (JHS and HLB 1902, p. 574).

*Total area:* Palearctic species. In Europe south as far as southern France (DEV 1935, p. 46), northern Italy (LUI 1929, p. 108), Montenegro (APF 1904, p. 301). Siberia (HEY 1880–1881, p. 38; PPP 1907d, p. 18; JEN, MO! WUO, MH!), east as far as Amur (BOD 1927b, p. 30). Northern Mongolia (PPP l.c.; JEN, MO!).

### Ecology

The mode of life of this species is reminiscent of *aenea*, with which it is often found together. Occurs in open, completely sun exposed and dry, mostly sandy or gravelly turf. Lives both on loose and more compact substrata, even on sparsely overgrown rocks. Also in the grass-rich parts of the Alvar† on Öld and Gtl. Additionally in gravel pits and on sandy cultivated soil. Vegetation always low, but often forms a thick turf. On grass roots, under *Calluna*, *Thymus*, etc., often somewhat buried. In large numbers only in coastal regions. In the rest of Europe a predilection for the seashore has also been noted (RTT 1908, p. 162; HOR 1941, p. 259; JEA 1941–1942, p. 919; OMH, E.M.M. 1932, p. 40) (not authenticated only in Mecklenberg, according to GRD 1937, p. 46); additionally found in heathlands (LTZ 1885–1892, p. 30; E.B. 1911, p. 19; HOR l.c.).

### Biology

Southern Swedish catches: II: 1; III: 0; IV: 8; V: 47; VI: 84; VII: 31; VIII: 17; IX: 8; X: 1. In Denmark also maximum abundance in June (LRS 1939, p. 336). Numerous immature beetles from July 4 (Skå) to August 19 (Ble). On Öld larvae found during July pupated on August 4 and August 17, and produced beetles on August 18 and September 3–4, respectively (WGR 1915, p. 83); in Denmark numerous larvae found in July and August (LRS l.c.). Breeds in spring and hibernates as an adult.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

## Dynamics

Wings fully developed. On May 30, 1940 (Gtl Ire) one specimen under glass induced to flight upon exposure to sun. Numerous specimens in sea drift near Öld Byerum (June 5, 1943, BRK!) as well as in Finland (Frey 1937, p. 437; STÅ 1938, p. 19; PME 1944, p. 38).

\**Amara (Cyrtonotus) torrida* Ill.

## Distribution

(map in LTH 1939a, p. 247)

*Sweden*: Only in the extreme north, but here widely distributed in the coniferous forest region and locally frequent. Southern boundary forms an almost straight line through the following localities: Nbt Piteå, 1883 (HGN, 3 specimens, HM!), 1936, 1 specimen (LTH); Pil Arvidsjaur, 1925, 3 specimens (LTH), 1936, 1 specimen (RGS!); Arjeplog, 1925, 3 specimens (LTH), 1936, 1 specimen (RGS!); Loholm, 1931, 5 specimens (PRS, ML!), 1932, 38 specimens (WLD, coll. LTH); Lyl Sorsele, Ammarnäs, Järnforsen, June 15, 1932, 1 specimen (GTZ!); Lake Tärna, July 2, 1935, 1 specimen (RUD, ML).

*Norway*: In northern Norway both on the coastland and the lower fjeld regions distributed without gaps, and usually very frequent. Southern boundary very sharply delimited by the following localities: 31 Sandnessjöen (MST 1927a, p. 302); Dönnä and Löhta (STE, MO!); 32, four localities in Ranen (STA, N.E.T. 1938, p. 85, and in litt.).

Erroneous: Dovre (STE; see N.E.T. 1921, p. 92).

*Finland*: Exclusively northern species, found everywhere above the Polar Circle. Southern boundary sharply defined by the following localities: Ob Kemi (EHN, MÅ! SAA, MH!); Pudasjärvi (Brander, MH! KRV); Ks Kuusamo (WEG).

Erroneous: In MÅ there are two specimens which, according to the labels, originate respectively from Ta Padasjoki and Sa St Michel (EHN!). A confusion of localities has obviously occurred.

173 *Russian sector*: Numerous localities in the western parts and along the coasts of the Kola Peninsula except for a gap between Lu Gavrilova (PPP 1905, p. 95; MH!) and Lj Triostrov (KLM, coll. HLL!). In Karelia only two localities in the north: Kk Kouta (MH!) and Kunttijärvi (PPP l.c.); also on Solovetsk Island in the White Sea (LEV, MÅ!).

*Adjacent regions*: Absent.

*Total area*: Palearctic species. In Europe, outside the region, only in northern Russia: Mezen (PPP 1908, p. 6); Kanin (PPP 1909, p. 8); Pechora (SBJ 1898, p. 339; PPP 1907c, p. 309). Siberia (HEY 1880–1881, p. 40; MKL 1881, p. 21), east as far as Taimyr (PPP 1910a, p. 320) and Kamchatka (BNN, NET, SBR 1929, p. 4).

### Ecology

On open, moderately humid turf or meadow soil with rich but not too tall vegetation. Especially on gravel (moraine), preferably with an admixture of loam. Since suitable biotopes in the northern Fennoscandian coniferous forest region occur almost exclusively only in cultivated regions, the species must be considered synanthropic to a certain extent and, at any rate, favored by culture (also see N.E.T. 1932, p. 26); often among weeds on farms or in rag stores†. An insect of the high boreal forest region, which already appears sporadically in the *reg. bet.* Permanent occurrence in the *reg. alp.* dubious, at least in Scandinavia. Such occurrence has been refuted for Norway (SPS 1888–1889, p. 110; MST 1927a, p. 302; STA, in litt.); in Sweden only one specimen recorded above the timber line (Lul Sarek; JNS 1926, p. 909; the record by ZTT 1840, p. 39 is doubtful); in Finland the old record in this connection (SBJ 1873, p. 104) has not been confirmed (see for instance LBÅ 1927, p. 19; 1933, pp. 117–119). On the other hand, on the Kola Peninsula isolated specimens have been recorded in the tundra region (PPP 1905, p. 95), also in Kanin (PPP 1909, p. 8), and purportedly on the Taimyr Peninsula in Siberia (PPP 1910a, p. 320). In these cases possibly synanthropic specimens were involved.

### Biology

In Sweden only during the months of June to August, and occurs rather uniformly; in northern Norway numerous, especially in spring (SPS 1888–1889, p. 110). Immature beetles sighted from July 21 (Tol) to August 14 (Lul). It is improbable that the species is an autumn breeder as assumed by LRS (1939, p. 520). Adult beetles hibernate and probably, as in *alpina*, partially developed larvae; thus development could well span a period of two years.

### Dynamics

Wings fully developed and certainly functional, but no corroborative data available.

*\*Anisodactylus binotatus* Fbr.

Distribution  
(map in BCH 1938, no. 5)

*Sweden:* In southern and central Sweden quite uniformly and certainly continuously distributed. Strangely, the species is absent in southeastern Skå and

† (“Lappenlager”, more likely means “at camps of Lapps”; suppl. scient. edit.).



occurs only on the eastern side of Gtl. Northernmost localities: Vrm Stöllet (Palm and LTH 1937, p. 119!); Dlr Lima, July 18, 1941, 1 specimen (OLS!); Floda, Stora-Hälla, April 24, 1938 (TJT!); Sundborn, Karlsbyn, June 9, 1941 (TJB!); Gst Storvik, June 1935 (JNS). Records from Hls possibly continuous with the foregoing (WBG, coll. JNS! Leg. ? 5 specimens, RM!), Delsbo (RUD, 1 specimen, MG!); Forsa (leg. ?, 1 specimen, RM!). Quite removed locality: Ång Örnköldsvik, on rather humid, sandy meadow land next to the Själevad River, July 9, 1936, 10 specimens (LTH).

*Norway:* Occurs throughout the southeast, continuously distributed westward as far as 5 Søgne and Heskestad. Northernmost localities: 2 Ringerike; 10 Grue in Solør (SIE 1875, p. 105). Farther north two totally isolated localities: 19 Sogndal; 24 Dovre, Kongsvoll (SIE l.c.).

*Finland:* South of latitude 62° N universally distributed and in the east continuously distributed even as far as Kb Juuka (KRG!). In the west five more or less isolated localities: Tb Keuru (PHJ; SAR); Oa Seinäjoki (PHJ); Norrskär, 1940 (LBÅ); Om Jakobstad (STÅ); Revonlahti (PME).

Doubtful: Ok Ruhtinassalmi (SSK, 1 specimen, MÅ).<sup>7</sup>

*Russian sector:* Only in the southernmost part of Karelia (several collectors!), north as far as Kn Petrosavodsk (PPP 1899a, p. 18; MH!).

175 *Adjacent regions:* In Denmark (including Bornholm) widely distributed and frequent (West 1940, p. 32). In Estonia (HAB in litt.; Palm!) and Latvia (SDL 1872; ULN 1884; HEY 1903; BRM 1930; LCK and MIK 1939; LCK in litt.) widely distributed. Leningrad region (OBT 1876). British Isles (Joy 1932, p. 353), also Ireland (JHS and HLB 1902, p. 570).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 145), Corsica (DEV 1935, p. 45), southern Italy including Sardinia, Sicily (LUI 1929, p. 89), Greece and Crete (OTZ 1886, p. 208). Northern Africa (BED 1895–1914, p. 148). Madeira and Azores (JEA 1941–1942, p. 608). Asia Minor (APF 1904, p. 212). The Caucasus (CHD 1846, p. 165; SDR and LDR 1878, p. 76). Eastern Kirgizia (HEY 1896, p. 21). Western Siberia (among others, SBJ 1880, p. 41; RM!).

### Ecology

Lives in open places richly covered with grasses, *Carex*, and similar plants, with moderate to high humidity. On loam-mixed sand or gravel, also on peat soil. Tolerates some shade. Often in the vicinity of bodies of water, for example sometimes frequent in the higher parts of shores of the large central Swedish lakes; also on cultivated soil, especially cultivated peat bogs. In forest regions, for example in Karelia, “greatly favored by culture” (PME and PFF 1943,

<sup>7</sup>Since in MÅ various totally unexpected species (e.g., *Cicindela hybrida*, *Calosoma inquisitor*, *Bembidion argenteolum*) are labeled “Ruhtinassalmi, SORSAKOSKI,” it is imperative that all these records be considered suspect.



p. 143). Occurrence on the seashore possibly always coincidental. In other parts of Europe also the requirement for humidity has been emphasized (GRD 1937, p. 48); also found in high moors† (Peus 1928, p. 577).

### Biology

Southern Swedish catches: II: 1; III: 1; IV: 11; V: 96; VI: 73; VII: 36; VIII: 13; IX: 8. In Denmark also maximum abundance distinctly in May (LRS 1939, p. 340). Numerous immature beetles from July 23 (Dsl) to September 6 (Ble). In Denmark numerous larvae in June and July (LRS l.c.). Breeds in spring and hibernates as an adult. Both adults and larvae carnivorous (BLK 1925, p. 26). According to SDT (1861, p. 156) hunts, often in large numbers under stacks of seaweed on the seashore.

### Dynamics

Wings fully developed. Spontaneous flight observed near Sdm Frustuna (May 176 6, 1938, BRD), Ta Hattula (KNG), and many times in Germany (LTZ 1885–1892, p. 22; DHM 1928, p. 184). Numerous specimens in sea drift in Finland (Frey 1937, p. 437; PME 1944, p. 38).

### Variation

A rare aberration, the red-legged form ("*spurcaticornis* Dej."), found together with the *forma typica* in the southern part of the region, in Sweden as far as Stockholm, and in Norway (ULL 1899, p. 296).

*\*Anisodactylus nemorivagus* Dft.

### Distribution

*Finland*: Extremely rare, found only in five localities: Ik Rautu, Suvenmäki, June 26, 1866 (SBJ 1871a, p. 334; 1873, p. 130; MH!); Sakkola (leg. ?, coll. HLL!); Kl Parikkala, Juvankoski, August 8, 1872, May 30, 1873 (SBJ 1873; MH! MÅ! coll. LBG!); Suistamo (HMM, MH!); Sb Kuopio (leg. ?, MH!).

*Russian sector*: Sv Swir (PPP 1899a, p. 18); Vitele, July 1942, 1 specimen (SAA!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark only single specimens from three localities on northeastern Sjaëlland (West 1940, p. 32; HSN and LRS 1941, p. 380). Not found in Estonia; contrarily, occurs in eastern Latvia (ULN 1884, p. 13). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 353).

† (= "Hochmoore"; suppl. scient. edit.).

*Total area:* Western Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 145), central Italy (LUI 1929, p. 89), Albania (APF 1904, p. 212). East as far as Ural (JAC 1905–1908, p. 389). Asia Minor (APF l.c.; BOD 1927a, p. 46). Iran (BOD 1927c, p. 31). The Caucasus (SDR and LDR 1878, p. 76).

### Ecology

The mode of life of this universally rare species is scarcely known. Near KI Parikkala several specimens were found on a dry sand hillock (SBJ 1873, p. 130) and there are similar records from Denmark (West 1940, p. 32). In general the requirement for humidity appears lower in this species than in *binotatus*, with which it occasionally lives (Dahl 1928, p. 173). In England found on heathland (E.M.M. 1917, p. 162), likewise in northwestern Germany (Peus 1928, p. 577).

177

### Biology

In Finland the few records are distributed over the period May to August; in Denmark (LRS 1939, p. 340) only four dated specimens from April and May. In Central Europe the species is known to hibernate as an adult (BUR 1939, p. 188). It may thus be assumed that the development of this species is the same as that of *binotatus*.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

\**Anisodactylus poeciloides* Steph.  
(*pseudoaeneus* auct. nec Dej.)

### Distribution

*Sweden:* Exclusively in the extreme southwest of Skå, three localities: Malmö, numerous specimens from 1879 to 1881 (several collectors!); Näset, Fotevik and Höllviken, August, September 1887, several specimens (PTT, several collectors!); Kämpinge, June 1886, 1 specimen (PTT, coll. THS, MB!). Later searches futile.

Absent from the rest of Fennoscandia<sup>8</sup> as well as in the Baltic States.

*Adjacent regions:* In Denmark rare and found only on the Falster and Sjaëlland Islands, a total of nine localities (West 1940, p. 32). British Isles,

<sup>8</sup>Records from Norway (FCK, E.B. 1930, p. 108; CKI 1927–1933, p. 1070) resulted from erroneous placement of the Danish locality Kongelunden.

only England (Joy 1932, p. 353).

*Total area:* Euro-Mediterranean species. In Europe along the west coast south as far as southern Spain (FUE 1920, p. 144). Along the Mediterranean Sea, from eastern Spain (FUE l.c.) through Corsica, northern and central Italy, Sardinia, Sicily (LUI 1929, p. 88), as far as Greece (OTZ 1886, p. 208); also in Rumania (JAC 1905–1908, p. 389). In the inland, among others from Germany (HOR 1941, p. 250), northern France (DEV 1935, p. 45), Spain (FUE l.c.). Northern Africa (BED 1895–1914, p. 147). It is not possible to state whether the species also occurs in western Asia, since it was earlier generally confused with *pseudoaeneus* Dej.

### Ecology

178 A halobiont species (LNG 1929, p. 54) that lives in our region and in Denmark exclusively on the seashore, while in Central and southern Europe also found at inland saline places. Lives in marshy meadows, usually buried among the roots of diverse halophytes (West 1940, p. 32), and *Salicornia* and *Juncus* (Rapp 1933, p. 93; BUR 1939, p. 188). In the German inland, among others, “at humid places devoid of vegetation (dried-up drain hole) under stones” (BLK 1925, p. 26), in salt meadows (GRD 1937, p. 37), etc.

### Biology

The few dated Swedish specimens can be divided as follows: VI: 20; VII: 6; VIII: 15; IX: 3. In Denmark too the decline in July is distinct (LRS 1939, p. 340). An immature beetle was found in September 1887 (Skå). In Denmark larvae found in July and August. Hence certainly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*Asaphidion caraboides* Schr.: Erroneously reported from Sweden: Nke Örebro (coll. HTG; JNS, E.T. 1927, p. 208). Both specimens are unquestionably wrongly labeled. The species is absent throughout all of northern Europe (as well as Denmark).

### \**Asaphidion flavipes* L.

#### Distribution

(map in BCH 1938, no. 4)

*Sweden:* Markedly local and rather sporadic in occurrence, but probably continuous in distribution in southern and central Sweden; more frequent in southern Sweden. Surprisingly the species is absent on the east coast of Skå

and only 1 specimen has been found on Öld. Northernmost localities: Vrm Stöllet, 1933 (Palm and LTH 1937, p. 117!); Dlr Transtrand, 1937, 1 specimen (RGS!); Idre (AND, 3 specimens, LF!); Stora-Tuna, Holmsjön, 1936, 1 specimen (KLF); Gustafs, Solvarbo, 1936–1938, several specimens (KLF); Gst Grönsinka, 1935, 2 specimens (Palm). Totally isolated: Ång Örnsköldsvik, on the northern bank of the Själevad River and on higher sandy ground, July 9, 1936, 21 specimens (LTH).

Doubtful: Jtl (MRT, 1 specimen, MG!); possibly wrongly labeled (cf. *Acu-palpus consputus*).

Erroneous: Lapland (FRG, according to ZTT 1840, p. 24; 1 specimen, ML!); certainly a confusion of localities.

179 Norway: Only in the southeast, a total of seven localities (N.E.T. 1923, p. 255) within a greatly restricted region, west as far as 2 Hokksund, May 20, 1925 (MO!) and Vikesund; north as far as 1 Lillestrømmen, May 1916 (MO!) and 10 Hoff in Solör.

Erroneous: 27 Gulelven and Vollan (BOH; SIE 1875, p. 85; N.E.T. 1923, pp. 255, 276; = *pallipes*, see LTH 1938, p. 13). 38 Lakselv in Porsanger (ULL 1899, p. 294; = *pallipes*).

Finland: In the south widely and continuously distributed, apparently without gaps. Northern boundary represented by the following localities: Ab Nystad (SDM, MH!); Oa Seinäjoki (PHJ!); Tb Keuru (PHJ); Sb Kuopio (LEV, MH! STN!); Kb Juuka, 1940 (KRG!); Pielis (leg. ?, MK). The species is probably absent on Åland.

Doubtful: Oa Vasa (WAS, according to SBJ 1873, p. 72). An occurrence here would connect the isolated Swedish locality in Ång (see above) through the Bothnian Sea with the Finnish area. Hence the report by WAS must be disregarded (see p. 13).

Russian sector: Southernmost Karelia many localities (several collectors!), north as far as Ko Petrosavodsk (PPP 1899a, p. 9; MH!).

Adjacent regions: In Denmark, including Bornholm, widely distributed and fairly frequent (West 1940, p. 12). Estonia, including Ösel (HAB in litt.); Latvia (SDL 1872; ULN 1884; LBÅ 1932). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 333), also Ireland (JHS and HLB 1902, p. 588).

Total area: Palearctic species. In Europe south as far as Portugal and southern Spain including the Balearic Islands (FUE 1919, p. 58), Corsica (DEV 1935, p. 23), southern Italy including Sardinia, Sicily (LUI 1929, p. 58), Greece and Crete (OTZ 1886, p. 205). Northern Africa (BED 1895–1914, p. 55). The Caucasus (CHD 1846, p. 209). Western Siberia (HEY 1880–1881, p. 52; SBJ 1880, p. 12).

### Ecology

Predominantly on shores; always along sweet, stagnant or slow-flowing bodies



of water, especially on the banks of small rivers. Also in ditches, in moist fields, etc. On loamy or highly loam-mixed sand or peat. Usually close to the water line, where the surface is humid and the vegetation does not form a continuous cover. Especially on bald loamy patches among fascicles of *Carex* and grasses, and also under foliage where it generally tolerates well the moderate shade of  
 180 deciduous trees and shrubs. PME and PFF (1943, p. 132) found a predilection in Karelia for "highly overgrown banks, often covered with a layer of humus"; I cannot confirm their observation that *flavipes* is less hygrophilous than *pallipes*. The "dual" occurrence of the species on banks as well as on all kinds of humid fields, has been mentioned several times for other regions too (Dahl 1928, p. 51; HOR 1937, p. 7; F'WL 1887, p. 122).

### Biology

Swedish catches: III: 1; IV: 3; V: 31; VI: 37; VII: 12; VIII: 1; IX: 6; X: 1. The sudden decline in July is also evident in Finland (KRG, N.E. 1923, p. 121) and Denmark (LRS 1939, p. 321). Certainly a spring breeder, as assumed by LRS (l.c., p. 373); hibernates as an adult, which has been supported by field observations in Germany (BLK 1925, p. 18; Rapp 1933, p. 34). The larvae reportedly found in hibernation (as recently as West 1940, p. 12) belong to *pallipes*, as shown by LRS (l.c.).

### Dynamics

Wings fully developed. Spontaneous flight observed in Germany (FRH 1897, p. 5). Recorded in sea drift in Finland, 3 specimens (PME 1944, p. 37).

### \**Asaphidion pallipes* Dft.

### Distribution

*Sweden*: The main area extends like a broad belt from the Polar Circle as far as southern Vrm, and in this region the species is locally rather frequent along the middle and lower reaches of the larger rivers. Delimiting localities: Southward—Vrm Edsvalla, 1933, numerous (LTH); Deje, 1933 (Palm and LTH 1937, p. 116!); Lundsberg, 1936, numerous (WRN!); Dlr Ludvika, 1940, 4 specimens (WSL!); Upl Älvkarleö, 1936, frequent (LTH). Westward: Vrm Torsby, 1926, (SVS!); Vingång, 1933 (Palm and LTH, l.c.!); Dir Lima, 1928, 1 specimen (OLS!); Hls Färila, 1941, 1942 (Lind, LBL, RM!); Ramsjö, 1943 (LDN!); Mdp Liden, 1937, numerous (BRC, RM!); Jtl Ragunda, numerous (FRI, several collections!); Ång Helgum, 1932, 1 specimen (LTH and Palm 1934, p. 34!); Åsl Vilhelmina, 1936, 1 specimen (LTH); Lyl Storuman, 1936, frequent (LTH); Lycksele, 1936, 2 specimens (LTH); Vbt Kusfors 1930, 2  
 181 specimens (LTH and Palm, l.c.!); Nbt Edeforsen, 1938, 1 specimen (LTH); Lul

Pålkem, 1942, 3 specimens (WRN). It remains uncertain whether the southern Swedish area is continuous with this. There are only the following 11 localities: Skå Ven, 1934, numerous (Palm 1935, p. 8!); Reslöv, 1898, 1 specimen (ROS, ML!); Ravlunda, 1936 (JNS); Vånga, 1920, 1 specimen (AMM, ML!); Båstad (THS, MB!). Små (BOH, 8 specimens, RM! FHR, 2 specimens, VA! ZTT, according to GYL 1827, p. 400), Strömsnäsbruk, 1936, 4 specimens (LTH); Skillingaryd, 1936, 2 specimens (LTH); Jönköping, Råslätt, 1870, 1 specimen (GAD, HM!). Vgl Skövde, 1928, 1 specimen (GTZ!). Ögl Mjölby, Lärketorp (ZTT 1840, p. 24); Omberg, 1931, 1 specimen (Palm! Finally, three localities in northern Lapland, which are certainly continuous with the Norwegian area: Lul, Sarek, Rapa delta (JNS 1926, p. 907), August 17, 1939, 2 specimens (LTH); Tol Abisko, 1 specimen (BRD 1934, p. 221), Nuolja, 1939, 1 specimen (KRG!); Vadvejk delta, frequent (BRD l.c.), 1939, 4 specimens (LTH).

*Norway:* In the southern half of the country predominantly an eastern species; between Oslo and Trondheim distribution apparently continuous. Westernmost localities: 3 Porsgrund (ESM); 16 Saude (MST); 15 Noresund (HLS 1891a, p. 9); Nes in Hallingdal (SIE); 13 Fåberg (SIE 1875, p. 85); Sel (MST); 24 Krokhaug in Folldal (MST); 27 Orkedal (LYS, N.E.T. 1937, p. 144); 28 Stjördal and Steinkjer (LYS l.c.). Then in the north (SPS 1888–1889, p. 100), from 31 Sandnessjöen (MST) as far as 41 southern Varanger, Jakobselv (MST, MO!), scarce but apparently continuous in distribution on the coast and in the valleys.

*Finland:* Very unevenly distributed but occurs in almost all parts of the country. In general, appears to avoid the coasts, and has been observed only in three such regions: I. Ab Nystad (SDM, MH!). II. Helsinki (several collectors!). III. Isthmus of Karelia (several localities and collectors!), including Seiskari (HLL!) in the Gulf of Finland. Apparently absent on Åland. In the inland surprisingly numerous localities in Ta. Otherwise the area is fairly continuous at least as far as the Polar Circle; delimiting localities northward here: Ob Iijoki (STN!); Ks Kuusamo and Paanajärvi (several collectors!); Salla (KNG). Finally, in the extreme north: Li Enare, Kaamasjoki (SBJ, according to PPP 1905, p. 88; MH!); Utsjoki (HLL); Lp Yläluostari (several collectors!); among others, LBÅ 1933, p. 115!).

*Russian sector:* Six localities in southern Karelia (PPP 1899a, p. 9; MÅ! PFF!), north as far as Kn Vornova (Kivatsch) (SBJ 1873, p. 72).

*Adjacent regions:* In Denmark fairly well distributed, also on Bornholm, 182 but seems to be absent in western Jylland and on the southern islands (West 1940, p. 12). Estonia (HAB in litt.; Palm!), also on Ösel (HAB 1936a); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 333), also Ireland (JHS and HLB 1902, p. 586).

*Total area:* Palearctic species. In Europe south as far as southern France (DEV 1935, p. 23), southern Italy (LUI 1929, p. 58), European part of Turkey (APF 1904, p. 79). In the northeast as far as Pechora (PPP 1907c, p. 307).

Asia Minor (ECH 1922, p. 31). The Caucasus (CHD 1846, p. 209). Siberia (among others, SBJ 1880, p. 12), east as far as Trans-Baikal (MDL 1931, p. 4).

### Ecology

On moderate to very dry fine sand (Swedish mjåla), often with an admixture of loam, with thin surface layer of muddy humus and extremely sparse vegetation, which consists particularly of very fine sparse moss, and isolated plants of *Ranunculus reptans*, *Equisetum* spp., *Agrostis* spp. and others. In our region the species occurs principally on the banks of larger rivers (see, for instance, SPS 1888–1889, p. 100; 1910a, p. 69; N.E.T. 1932, p. 24; N.E. 1923, p. 121; 1938, p. 126; LBÅ 1933, p. 115; PME and PFF 1943, p. 131), more rarely at lakesides or seashores, but usually quite some distance from the water, even in sand pits and similar situations. Does not occur in completely open situations, but in moderate to strong shade of *Salix* bushes, *Alnus*, *Betula*, and other deciduous trees. Successive species: first and foremost species of *Bledius*, i.e., *B. opacus* Block and *longulus* Er., then *Dyschirius politus*, and frequently *Syncalypa paleata* Er. It occurs less frequently together with its congener *flavipes*, since the latter prefers a somewhat humid surface and greater admixture of loam. Outside the region also occurs regularly on banks of rivers (see FWL 1887, p. 122; E.M.M. 1913, p. 187; HOR 1941, p. 114); additionally found more often than with us in gravel pits and brick kilns (West 1940, p. 12; Dahl 1928, p. 52; GRD 1937, p. 40; HOR l.c.). In the fjelds extends right into the *reg. bet.* (see BRD 1934, p. 221), but to date not observed above the timber line. In the Alps occurs even in high alpine regions (SZM 1907, p. 121).

### Biology

Swedish catches: V: 3; VI: 26; VII: 18; VIII: 7; IX: 2. The sharp increase in June is also evident in Denmark (LRS 1939, p. 321); according to KRG (N.E. 1923, p. 121) it becomes frequent in Ik only in July. Immature beetles  
183 June 20 (Vrm) and July 19 (Lyl). Larvae in Denmark (LRS l.c.) from end of April to beginning of July. It therefore certainly hibernates in the larval stage. According to RSB (BLK 1925, p. 18, "*flavipes*") the larvae live together with larvae of *Bledius* and might feed on them.

### Dynamics

Wings fully developed. Spontaneous flight of two beetles observed near Lul Pållem, July 4, 1942 (WRN). In sea-drift material in Finland, 10 specimens (PME 1944, p. 37).



*\*Badister<sup>9</sup> bipustulatus* Fbr.

Distribution

*Sweden*: Continuously distributed in southern and central Sweden. In the southeast, including Öld and Gtl, especially frequent; however the striking density of the points there on the map is partly due to the fact that these regions have been particularly thoroughly explored by LOH using the sieve technique. The northernmost localities are: Dsl Vårvik, 1938 (LOH); Vrm Arvika, Gränsjön, 1938, 2 specimens (EVK!); Alster (ZRN!); Lundsberg (WRN); Karlskoga (KLF); Vst Nora, 1936 (LTH); Dlr Ludvika, 1916, 1939 (FRL! WSL!); Horndal, not rare (Palm!); Gst Ockelbo, 1938, 1 specimen (NST, coll. LTH); Hamrånge, 1936, 1 specimen (LTH).

Erroneous: Lapland (GLL 1896, p. 15).

*Norway*: In the southeast and along the southern coast, westwards as far as 5 Kjørre Fjord near Farsund and 6 Hafrs Fjord (HLS 1915, p. 32). The northernmost localities are: 12 Gran and Biri; 10 Amot (SIE 1875, p. 103); also, isolated near 24 Drivstua in Dovre.

*Finland*: In the south distributed continuously and probably without gaps. The northern boundary forms an acute oblique line represented by the following localities: Ab Åbo region (several collectors!); St Karkku (HLL); Ta Ruovesi (SAR); Sb Kuopio (SBJ 1873, p. 124; MH! KRG!); Kb Juuka, Hali-vaara, 1940 (KRG!).

*Russian sector*: Only four localities in southern Karelia: Sv Vaaseni, 1942 (KRV!); Uslanka, 1943 (PFF!); Kuujärvi, 1943 (PFF); Ko Petrosavodsk (PPP 1899a, p. 17; MH!).

*Adjacent regions*: In Denmark (including Bornholm) widely distributed and frequent (West 1940, p. 23). Estonia (HAB in litt.); Latvia (SDL 1872, 1891; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 346), also Ireland (JHS and HLB 1902, p. 565).

*Total area*: Circumpolar species. In Europe south as far as southern Spain (FUE 1919, p. 104), Corsica (DEV 1935, p. 36), southern Italy, including Sardinia, Sicily (LUI 1929, p. 86), Montenegro (APF 1904, p. 163). Northern Africa (BED 1895–1914, p. 104). Iran (BOD 1927c, p. 43). The Caucasus (CHD 1846, p. 119; SDR and LDR 1878, p. 67). Kirgizia (HEY 1880–1881, p. 24). Western Siberia (HEY l.c.; JAC 1905–1908, p. 308). North America, Vancouver (Leng 1920, p. 62).

<sup>9</sup>The close ecological relationship among species of *Badister* is evident, for example, from the fact that I found all five of our species (in addition to *dorsiger* Dft.) together in a rich deciduous forest swamp near Finkenkrug close to Berlin, during a field trip in the company of Hans Wagner and Herm. Müller.



## Ecology

A species predominantly of semidry, sparse deciduous forest with a pronounced humus layer on gravelly or stony soil. Does not tolerate complete shade and hence found mostly along the fringe or in forest clearings. Additionally found in fairly humid places, even on overshadowed banks, but then only occurring solitarily. Strangely, the species is a typical insect of the grass-rich Alvar† of Öld and Gtl, where it almost always lives in moss of *Juniperus* and other shrubs. In general its mode of life is concealed—inside moss, under foliage, and among roots of plants.

## Biology

Swedish catches: I: 1; II: 0; III: 8; IV: 33; V: 72; VI: 102; VII: 51; VIII: 38; IX: 32; X: 13; XI: 1. The decline during midsummer is much more pronounced in Denmark (LRS 1939, p. 344). Immature beetles, July 31 (Skå) to September 6 (Gtl). In Denmark a larva was recorded at the end of August (LRS l.c.). Spring breeder, hibernating as an adult. The carabid is certainly carnivorous (ZPT 1931, p. 398).

## Dynamics

Wings fully developed but the apical part comparatively shorter than in *unipustulatus*. Nevertheless the species has certainly flight capacity. Spontaneous flight has been reported from Hungary (HST, E.N. 1876, p. 79), and in Finland seven specimens have been found in sea drift (Frey 1937, p. 436; STÅ 1938, p. 19; PME 1944, p. 38). Upon exposure to sun under glass (Upl Djursholm, July 5, 1942), one beetle exhibited readiness for flight (raised elytra, etc.) but did not actually fly.

## Variation

Especially in eastern Sweden (Skå–Gst) specimens have been found in which the scutellum is brown or, as in *unipustulatus*, yellowish-red. They do not differ from the *forma typica* in internal structure of the penis however, and hence this color variation might represent only a climatic modification.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

\**Badister dilatatus* Chaud.

Distribution

Due to the earlier confusion of this species with *peltatus*, its distribution is somewhat incompletely known.

*Sweden*: A markedly southern but concomitantly eastern species. Skå Sandhammaren, at the sea, 1931 (Palm!); Äsperöd (leg. ?, MM!); Skanör, 1940, numerous (Palm!); Lerhamn, 1936 (Palm); Stehag, 1882–1894 (ML! MM!). Ble Gammalstorp, Ryedal, 1935 (LOH, MG!). Hll Breared, 1918 (FGQ!). Små Kalmar (HGL, coll. JNS!). Öld (numerous old collectors!), Borgholm, 1928 (LOH, coll. JNS!); Stora-Rör region (numerous collectors!). Gtl Visby, 1940 (LTH); Vamlingbo, 1934 (JNS!). Ögl Graversfors, Näkna, 1908 (WRN, coll. LTH). Sdm Sparreholm (SDN, MG!); Mälärbaden, 1936 (LTH); Toresund (SLL, VA!); Hamnskär and Ridö in Mälaren, 1931, 1936 (BRC, LTH). Stockholm (BOH, MG!). Vst Västerås (SDN, MG! SLL, VA!). Upl Danderyd, Nora, 1942, numerous (LTH); Svartsjö, 1942 (OLS!); Uppsala (FRI, MG!); Rådmansö, 1920 (RMN, coll. Palm!); Öregrund, 1936, 1 specimen (LTH).

*Norway*: Only one locality: 1 Hvaler, Arekilen in Kirkeøy, September 30, 1925, 1 specimen, May 1926, several specimens (“*peltatus*”; MST, N.E.T. 1926, p. 149; MO!).

*Finland*: The first Nordic country in which the species was discovered, found in 1915 (M.F.F 1916, p. 139). Only a few localities in the south which, however, possibly form a continuous area. Also on Åland (LNN, MÅ!), Eckerö, Torp, June 19, 1943 (LBÅ). Northernmost localities: Ta Tavastehus (RNK!); Sa Kristina (SUH!); Ki Sordavala (LNN, MÅ!); Salmis (PFF, PME!). Also Hogland and Tytärsaari in the Gulf of Finland (HLL!).

*Russian sector*: No records to date.

*Adjacent regions*: In Denmark known to date with certainty from Jylland, Sjäëlland, and Bornholm (West 1940, p. 23, and in litt.). In Estonia not recorded to date but ought not to be absent; contrarily found in Latvia, 186 Ventspils (LCK and MIK 1939, p. 55; as “var.” of *peltatus*. There is no record from Leningrad region as far as I know. British Isles (Joy 1932, p. 346), also Ireland (OMH 1929, p. 23).

*Total area*: Palearctic species. In Europe south as far as southern France (DEV 1935, p. 36), central Italy (LUI 1929, p. 86; PTA 1934, p. 97), Greece (APF 1904, p. 164). East at least as far as Slovakia (ROU 1930, p. 146) and Poland (TEN 1937, p. 336); southern Russia (according to CKI 1927–1933, p. 907). Syria (according to CKI l.c.). The Caucasus (LSH 1936, p. 142). Western Siberia (SBJ 1880, p. 40, “*peltatus*”; male, MH!).

## Ecology

The mode of life of this species is entirely identical to the one of *peltatus*, and the two species are often found together. It thus lives on shores, along stagnant, markedly eutrophic waters, by the sides of small ponds and along the largest lakes. The soil must be wet and very soft, usually consisting of gyttja† (mostly loam-mixed), and frequently with a considerable admixture of humus. Among tall, dense vegetation of *Phragmites*, *Glyceria* or *Carex*, or in the shade of bushes and deciduous trees. In foliage, in moss, and dry stacks of *Phragmites* etc. Occurrence on the seashore certainly only accidental. In Central Europe likewise found many times together with *peltatus* (Dahl 1928, p. 175; E.B. 1937, p. 19; also see footnote 9 above).

## Biology

Distribution of the few Swedish catches: IV: 1; V: 8; VI: 9; VII: 4. It therefore seems to be a spring insect, which certainly hibernates as an adult.

## Dynamics

Wings fully formed. Flight observations from Ab Lojo (KRG) and the Caucasus (LSH 1936, p. 142). Its regular occurrence on seashores as well as the record of eight specimens in sea drift in Finland (PME 1944, p. 38) indicate good flight capacity.

### \**Badister peltatus* Panz.

#### Distribution

All older records may be cited only after re-examination of voucher specimens.

- 187     *Sweden*: In Skå only three definite localities: Kåseberga and Sandhammaren, seashore, 1931 (Palm!); Ven, 1934 (Palm!); Stehag, repeatedly found (MG! ML! MU!). Hil Åskloster (ERC, MG!). Vgl Göteborg, Hisingen, 1870, not recorded since then (SDN, manuscript; MG!). Also on Öd and Gtl, several localities. In eastern central Sweden rather widely distributed but highly local. Delimiting localities: south and west—Ögl Opphem, 1939 (WRN!); Tåkern, not rare (several collectors!); Vgl Norra-Fågelås, 1935 (LOH, MG!); Karlsborg, 1936 (LTH); Vrm Ekenäs, 1933 (LTH). Northward: Nke Östra-Sundholmen in Hjälmaren (JNS, E.T. 1918, p. 19); Vst Västerås (several collectors!); Upl Uppsala region (several collectors!); Forsmark, 1936 (LTH); Gst Ovansjö, Väsaren, June 30, 1936, 3 specimens (LTH).

*Norway*: Record based on *dilatatus*.

†(cf. page 69; suppl. scient. edit.).

*Finland:* On the southern coast continuously distributed, west as far as NI Tvärminne (PME!), east as far as Ik Terijoki (KRG!). Also on Åland (KRG! LBG!) and Kökar, Idö (STK). Northernmost localities situated inland and on Lake Ladoga: Sa St Michel (KRV!); KI Parikkala (SBJ 1873, p. 124; MH!); Sordavala (LNN, MÅ!). Also in Tytärsaari in the Gulf of Finland (HLL!).

Doubtful: KI Suistamo (RNK 1938, p. 67; no voucher specimen).

*Russian sector:* Only three definite localities: Sv Sermaks (PPP 1899a, p. 17; MÅ! coll. HLL!); Gumbaritsa (PME!); Kn Solomino (PPP l.c.; MH!).

Doubtful: Kn Kosmosero (PPP l.c.; no voucher specimen).

*Adjacent regions:* In Denmark, on the islands (including Bornholm) as well as in Jylland (West 1940, p. 23, and in litt.; JNS, E.T. 1933, p. 62). Estonia (HAB in litt.) and Latvia (LCK and MIK 1939). According to OBT (1876) found in Leningrad region, but apparently not separated from *dilatatus* British Isles (Joy 1932, p. 346).

*Total area:* Probably Palearctic. In Europe south as far as Portugal (JEA 1941–1942, p. 1006), Corsica (DEV 1935, p. 36), central Italy, Sardinia, Sicily (LUI 1929, p. 87), Greece (APF 1904, p. 164). East as far as Slovakia (ROU 1930, p. 146), Transylvania (JEA l.c.); recorded from a large part of Russia (JAC 1905–1908, p. 308). Also recorded in: northern Africa (BED 1895–1914, p. 104), the Caucasus (JAC l.c.), Siberia (HEY 1880–1881, p. 24). A re-examination of these records is desirable however. The occurrence in North America (RTT 1900, p. 147) has not been referred to by Leng (1920).

## Ecology

The mode of life of the species so completely accords with that of *dilatatus* that reference may be made to the latter species. However, *peltatus* seems to live somewhat more often at quite small ponds that dry up in summer (in meadows of leaves† and deciduous forest swamps), remaining in *Amblystegium* and other mosses among tall vegetation of *Filipendula ulmaria* and similar plants. In France also in forest swamps (JEA 1941–1942, p. 1006).

## Biology

Swedish catches: III: 3; IV: 5; V: 12; VI: 12; VII: 4; VIII: 0; IX: 2; X: 0; XI: 1. Hence a pre-eminent spring insect like *dilatatus*. Certainly hibernates as an adult.

## Dynamics

Wings fully developed. Spontaneous flight observed near Ögl Tåkern, May

†(cf. pages 235 and 286 of Part III; suppl. scient. edit.).



6, 1934 (LTH); flight also recorded in Hungary (HST, E.N., 1876, p. 79). In Finland numerous specimens found in sea drift (Frey 1937, p. 436; STÅ 1938, p. 19; PME 1944, p. 38).

\**Badister sodalis* Dft.  
(*humeralis* Bon.)

Distribution  
(map in BCH 1938, no. 35)

*Sweden*: Exclusively in Skå, as well as on Öld, and Gt. Skå Dalby, 1866 (THS 1867a, p. 53; 1867b, p. 42; 2 specimens, MB! MLC, HM! Roth, MU!), May 4, 1926 (BRD!); Stehag, 1881, 1882, 1892 (several collectors!); Vittskövle, August 3, 1926, 1 specimen (LOH!); Kullen, May 1892, 3 specimens (leg. ?, MG!), May 1923, 3 specimens (LOH!). Öld Kastlösa, 1924, 1928 (LOH, according to JNS); Vickelby, June 4, 1928 (id.); Algutsrum (id.); Halltorp region, since circa 1870 (several collectors!); Borgholm, 1924 (JNS), 1928 (LOH, according to JNS). Gt. Vamlingbo, 1927, 1934 (LOH!); Burgsvik (JNS), June 8, 1934 (LOH!); Källunge, July 6, 1934, 1 specimen (LOH); Lärbro, Vägome, June 10, 1942, 1 specimen (BGW!).

*Norway*: Absent.

*Finland*: Only one locality: K1 Suistamo, July 26, 1934, 1 specimen (RNK 1938, p. 67; S.H.A. 1936, p. 46).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed but not frequent, occurring in eastern Jylland as well as on the islands, including Bornholm (West 1940, p. 23). In southern Estonia two localities (SDL 1891; HAB in litt.); not known in Latvia. On the other hand found in Leningrad region (MAS 1906, p. xcvi; BSK 1929, p. 146). British Isles (Joy 1932, p. 346), also Ireland (JHS and HLB 1902, p. 565).

*Total area*: Western Palearctic species. In Europe south as far as southern France and Corsica (DEV 1935, p. 36), central Italy (LUI 1929, p. 86), Bosnia (APF 1904, p. 163), Transylvania (PTI 1912, p. 24). East as far as Volga (JAC 1905–1908, p. 308). Asia Minor (according to HOR 1941, p. 199). Iran (BOD 1927c, p. 43). The Caucasus (RTT 1900, p. 146).

### Ecology

Inhabits swampy, loam-mixed humus soil in shaded situations; often at shores of stagnant but usually very small bodies of water, which dry up in summer. In deciduous forests or rich meadows under bushes and trees such as *Populus tremula*, *Salix*, *Crataegus*, etc., usually among tall herbs (*Filipendula ulmaria* and similar plants). Lives in moss and foliage, and is usually collected by sieving. Data from other countries likewise confirm the stenotopic occurrence of this

species in deciduous forest swamps (for instance, West 1940, p. 23; Dahl 1928, p. 174; E.B. 1937, p. 19).

### Biology

The few Swedish catches are distributed as follows: III: 1; IV: 3; V: 14; VI: 7; VII: 4; VIII: 1; IX: 0; X: 1. In Denmark extensive material has been collected and the decline in June is much more pronounced; it is undoubtedly a spring breeder and hibernates as an adult (LRS 1939, pp. 345, 422).

### Dynamics

Wings (in Swedish specimens) with reflexed apical part, but at most only slightly longer and not as broad as an elytron. It is possible that macropterous individuals occur in other regions; in our region the species is evidently flightless.

### *\*Badister unipustulatus* Bon.

#### Distribution

Sweden: Area highly split. I. Skå Fågelsång near Lund (ZTT, according to THS 1859, p. 269; no voucher specimen); Stehag, Gyaby, 1880–1888, numerous (Roth, ML! MLC, HM!). Not found subsequently in Skå. II. Små (GLL 1896, p. 15), Kalmar (WLN, 1 specimen, LG! One cannot rule out entirely that this is an erroneously labeled specimen from Öld). Öld Torslunda, May 1871 (leg. ?, 4 specimens, coll. TIM, LU! 1 specimen, ex coll. HGL, coll. LTH), Tveta, June 5, 1924 (LOH!); Halltorp, many specimens from numerous collectors until about 1910, but not collected since then (!). Gtl Burgsvik (D. Lindberg, according to JNS); Eksta, July 3, 1927, 2 specimens (LOH!); Källunge, July 29, 1934, 1 specimen (LOH!). III. Isolated in the Mälars region. Sdm Toresund (SLL, 5 specimens, VA!); Mälarsbaden, June 20, 1936, 2 specimens (LTH). Vst Västerås (DGH, E.T. 1911, p. 207; SDN, 44 specimens, MG! SLL, 5 specimens, VA!). Upl Uppsala (SJB), 1906, several specimens (LBL, E.T. 1911, p. 207; RM!), Vårdsätra, June 25, 1907, 3 specimens (CDG); Spånga, Rockstasjön, May 27, 1944, 1 specimen (B. Nyman!).

Erroneous: Gtl När and Lau (LTH, E.T. 1924, p. 132, = *bipustulatus*!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rare, occurring on the islands (including Bornholm) as well as in southern Jylland (West 1940, p. 22). In Estonia three localities, of which one on the northern coast (HAB in litt.); Latvia (SDL 1872; LCK and MIK 1939; LCK in litt.); Lithuania (HEY 1903). Leningrad region (BAR 1922, p. 54). British Isles (Joy 1932, p. 345), also Ireland (JHS and HLB 1902, p. 565).

*Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 104), central Italy and Sicily (LUI 1929, p. 86), Greece (OTZ 1886, p. 207). East as far as Slovakia (ROU 1930, p. 145), Transylvania (PTI 1912, p. 24), Ural (JAC 1905–1908, p. 308). Asia Minor (according to HOR 1941, p. 198). The Caucasus (RTT 1900, p. 146; LSH 1936, p. 142). Caspian Sea region and Kirgizia (JAC l.c.). Western Turkestan (HEY 1893, p. 26; 1896, p. 21).

### Ecology

Like *sodalis*, lives on swampy soil, shaded with trees or bushes, and hence ordinarily much more humid situations than *bipustulatus*. Usually at small forest ponds and puddles; additionally, at least in central Sweden, on shady shores of larger eutrophic lakes. Probably always on loam-mixed humus soil. Lives hidden in moss and foliage. In Central Europe always at forest ponds and forest swamps, prefers to live especially under *Salix*, where it is even found under the bark (LTZ 1847–1852, p. 129; Dahl 1928, p. 174; NBG 1937, p. 379), and also under *Alnus* (JNN 1905, p. 183; GRD 1937, p. 48).

191

### Biology

The very few dated Swedish catches are distributed as follows: II: 1; III: 0; IV: 3; V: 3; VI: 3; VII: 2; VIII: 0; IX: 1; X: 1; XI: 2. In Denmark maximum abundance in June and the first half of July, with a sudden decline in the second half of July (LRS 1939, p. 345). Undoubtedly a spring breeder, hibernating as an adult (l.c., p. 422).

### Dynamics

Wings fully developed, the apical part much better developed than in *bipustulatus*. Insect undoubtedly with flight capacity. The accidental occurrence on a sandy sea beach in Mecklenburg (GRD 1937, p. 48) may be mentioned as an indication of flight capacity.

\**Bembidion (Philochthus) aeneum* Germ.  
(*biguttatum* Thoms. p. p., *marinum* Schiøp.)

Distribution  
(map in LTH 1939a, p. 262)

*Sweden:* Predominantly on the coasts where it is continuously distributed in the west. Southernmost locality Skå Trälleborg, June 1861 (MLF, MG!); northernmost Boh Strömstad, July 22, 1923 (LBÅ, E.T. 1924, p. 191!). The species seems to be absent in eastern Skå, yet has been found near Ble Ronneby



(ERC, coll. JNS!) and in Små (certainly Kalmar area, HGL, 2 specimens, coll. JNS!). On Öld numerous localities (several collectors!), in the northern part however recorded only near Källa, July 13, 1928 (LOH, coll. JNS!). In central Sweden its area is very wide and distinctly emanates from the west coast. Delimiting localities: southward—Vgl Alingsås (ERC, MG!); Hjo, bank of Lake Vätter, June 6, 1936, 3 specimens (LTH); Ögl Omberg region on the bank of lake Vätter, and also 1 specimen from Tåkern (Palm! JNS! LTH). Eastward: Ögl Medhamra, bank of lake Vätter, May 25, 1927 (Palm!); Nke Örebro, 1928 and 1935, numerous (JNS! NYH!); Upl Uppsala, 1 specimen (ARW!). Northward: Upl Skutskär, seashore, June 28, 1936, 1 specimen (LTH); Dlr Hedemora (RGS!), 1935 (JNS!); Säter (AND, LF); Falun, April 27, 1930, 1 specimen (TJB, coll. LTH); Ludvika, 5 specimens (WSL!); Vst Grythyttan, June 15, 1936, 2 specimens (LTH); Vrm Lundsberg, 1936–1940, numerous at several localities (WRN!); Ölme, 1936, 2 specimens (LTH); Skoghall, 1933, 1 specimen (Palm and LTH 1937, p. 118!); Säffle, 1933, 7 specimens (LTH); Dsl Mellerud region (FBG!); Bolstad, 1933, 1 specimen (LTH).

192 *Norway*: Two widely separated areas: I. Extreme southeast, partly on the seashore, west as far as 3 Tönsberg (MO!), and partly in the inland north as far as 1 Lillestrømmen. II. Between Trondheim region and Lofoten, exclusively at the sea. Probably this area is undivided and the existing gaps only apparent. 26 Hitra and Beian (MO!); Dolmøy; Rissa (N.E.T. 1937, p. 145!); Vallersund (HSS, according to STA). 27 Trondheim (N.E.T., l.c.), July 9, 1933 (LBÅ!). 28 Tynes in Verdal, July 1840 (ZTT, ML!). 31 Sandnessjöen; Dönnä; Lökta; Bodö (all in MO!), again Bodö, June 1925, frequent (LTH). 34 Svolver (MST, N.E.T. 1923, p. 255; MO!).

*Finland*: Only a single, completely isolated locality in the north, close to the Russian border: Ks Paanajärvi, June 25, 1934, July 23, 1935, 1 specimen each (KRG! N.E. 1935, p. 119; LTH 1939a, p. 263).

*Russian sector*: No records.

*Adjacent regions*: In Denmark exclusively on the coast, particularly in Jylland, but also on the three largest islands, to date not found on Bornholm (West 1940, p. 17). Absent in the Baltic States.<sup>10</sup> British Isles (Joy 1932, p. 336), also Ireland (JHS and HLB 1902, p. 581).

*Total area*: Palearctic species. In Central Europe exclusively on the seashore, south as far as northern France (DEV 1935, p. 23), east as far as Mecklenburg (HOR 1941, p. 164). Central Spain (WGN, C.C. 1926, p. 104). In the Mediterranean region, as well as in northern Africa and Asia Minor distinct varieties occur (NET 1914, p. 172), likewise in the Caspian Sea region (RTT 1908, p. 122), and also in Central Asia (MUL 1918, p. 67).

<sup>10</sup>Due to a gross misinterpretation of data by RHL (1905, p. 6), this species has been reported by Leng (1929, p. 44) as occurring in Estonia and Latvia.



## Ecology

On moderately humid loamy soil with more or less rich but short vegetation of *Carex* or grass, usually interspersed with bald patches. Primarily (in our region on the Swedish west coast from Skå to Boh and in Norway) a seashore species, which however does not live in the littoral zone but above the high-water mark, often at a considerable distance from water (also noted in Germany; NBG in HOR 1941, p. 164). Additionally (in central Sweden, including Öld, and southeastern Norway) found in the inland on loamy banks of lakes and rivers, but lives equally well in fields and at building sites, as well as along small ponds in the Alvar† of Öld. These places contain no salt. Always in open  
 193 situations, shaded at most by ground vegetation. Outside the region there are inland records of the nominal subspecies only from Spain (see above) and the British Isles (FWL 1887, p. 105; OMH, E.M.M. 1928, p. 150), and for that reason the species has been described as a "halobiont" (LNG 1929, p. 44; HOR 1941, p. 164), which is certainly wrong. On the contrary, the species may be dependent on the postglacial marine loam deposits in our region, which form a broad belt across central Sweden.

## Biology

Swedish catches: III: 1; IV: 8; V: 14; VI: 24; VII: 14; VIII: 1; IX: 0; X: 0; XI: 1. In Denmark extensive material available and the maximum abundance definitely occurs in May and the beginning of June (LRS 1939, p. 325). Immature beetles on Öld, July 13 and July 23, in Boh, July 26 (numerous) but also 1 specimen (in addition to 5 specimens with hardened cuticle), April 14, 1940 (Skå Lund, BRK!). Without doubt the species is normally a spring breeder, as assumed by LRS (l.c., p. 383), and hibernates as an adult, although besides the larvae also seem capable of hibernation. In captivity the beetles avidly consumed freshly killed flies (LTH).

## Dynamics

The species shows functional dimorphism (LTH 1939a, p. 262). Wings always with a reflexed apical part; however it is so short in the brachypterous form, and the entire wing so narrow that it is incapable of flight. The macropterous form has flight capacity; one specimen was induced to flight upon exposure to hazy sunshine in a glass (Boh Torreby, July 1944). Both forms show a characteristic distribution, whereby only macropterous specimens have been recorded in the actual inland.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

\**Bembidion (Peryphus) andreae polonicum* J. Müll.<sup>11</sup>  
 (concinnum Thoms.<sup>12</sup> nec Steph., cruciatum Schiø.  
 nec Dej., dissolutum Hellén)

#### Distribution

*Sweden:* Exclusively on the seashore in the extreme southwest. Skå Landskrona, Glumslövs-backar, July 1, 1937, 2 specimens (BRD, coll. LTH); 194 Ålabodarna (between Hälsingborg and Landskrona), May 23, 1938, 1 specimen (HZE!); Ven, 1934, locally frequent (Palm 1935, p. 8!); June 2, 1935, several specimens (LGN!). Hll Östra-Karup and Skummeslöv, on the seashore locally frequent, July, August 1939 (TJB! KLF!); Halmstad (GYL 1810, p. 15, "*andreae*"; FHR, according to THS 1869–1895, p. 361, "*concinnum*"; 3 specimens, RM! FGQ, E.T. 1941, p. 187! SDN, 50 specimens, MG!); Eldsberga, Laxvik, June 5, 1935, 2 specimens (Palm); Falkenberg, 2 specimens (KLF!).

Doubtful: Skå Hälsingborg (VNS, E.T. 1902, p. 194, "*concinnum*," no voucher specimen).

*Norway:* Absent.

*Finland:* Occurs on the southern coastland and in the Ladoga region, but not continuously distributed. Al Eckerö, 1 specimen (KRG, MH!). Nl Ekenäs, 1 specimen (THB!). Ka Fredrikshamn, 1 specimen (PHJ!); St André, 1 specimen (HLL!); Ik, several localities (several collectors!); K1 Salmis, two localities (PFF!). Additionally, in Tytärsaari in the Gulf of Finland (HLL!).

*Russian sector:* In the Swir region six localities (several collectors!), also near Vitele on Lake Ladoga, 1942, several specimens (KNG!). Isolated near Kn Karhumäki, August 1943, 2 specimens (PRT!).

*Adjacent regions:* In Denmark occurs exclusively on the coast, but rarely widely distributed, in Jylland north as far as Lønstrup (RYE 1906, p. 16; NET 1937a, p. 241), also on Bornholm (West 1940, p. 15). In Estonia, including Dagö, widely distributed, both on the coast and in the inland (SUM 1931, FCK 1936; Palm 1943; HAB in litt.); likewise in Latvia (ULN 1884; RHL 1921; LCK and MIK 1939); also on the coast in Lithuania (FCK 1936). Leningrad region (SBJ 1873; OBT 1876). British Isles (NET 1937a, p. 232).

*Total area:* Palearctic species. The true *andreae* Fbr. in Mediterranean. The subspecies *polonicum* occurs partly in the east, in Russia and Poland (NET 1937a, pp. 230, 232), and partly in the Baltic and North Sea regions, in Germany only on the coast (HOR 1941, p. 140). Also in western Siberia (SBJ 1880, p. 18; "*andreae*"; RM!) and Altai (NET l.c.). The closely related subspecies *bualei* Duv. is found in the Central European mountains, north as far as Thüringen (HOR l.c.). The subspecies *xanthomum* Chaud. is found in

<sup>11</sup>Also see *Bembidion femoratum*.

<sup>12</sup>However, both specimens of "*concinnum*" in coll. THS (ML), Skå Malmö, belong to *ustulatum*!

the Caucasus. Other older records of "*andreae*" need to be re-examined (for instance, PPP 1906b, p. 30; 1907c, p. 308; 1907d, p. 7; 1908, p. 5).

### Ecology

In Sweden occurs exclusively on the sea, on humid, almost or completely barren sand, often with a considerable admixture of loam, both on horizontal  
195 sandy surfaces and steep slopes of the shore, especially at such places where the surface is moistened by gushing waters. According to PME and PFF (1943, p. 137), in Finland it is a stenotopic riverbank species, which inhabits especially the fairly dry supralittoral precipices of sand and fine-grained sand with sparse vegetation (see also N.E. 1923, p. 122; 1938, p. 126). On the other hand, HLL (N.E. 1928, p. 81) reports an occurrence near Ik Terijoki which corresponds entirely with that in Sweden. In Denmark (SDT 1870, p. 412; West 1940, p. 15) and northern Germany (HOR 1935, p. 29; FCK, E.B. 1936, p. 261; GRD 1937, pp. 40, 66), *polonicum* lives similarly at the sea. On the other hand, on the British Isles (FWL 1887, p. 117, "*anglicanum*") and in eastern Europe it occurs on river banks.

### Biology

The few Swedish catches were made in the months of May to September. In Denmark, with more extensive material (LRS 1939, p. 323), maximum abundance occurs in May and August. I saw an immature beetle from Estonia (August 4, 1938, Pärnu, Palm). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent to date however.

*\*Bembidion (Chrysobracteon) argenteolum* Ahr.

### Distribution

(maps in NET and MEY, E.B. 1933; LTH 1939a, p. 255)

*Sweden*: Exclusively in Vrm and Dlr. Vrm (MLB, according to THS 1859, p. 199; 2 specimens, RM!); many localities on Klarälv River, June 1933, between Forshaga and Långflon (Palm and LTH 1937, p. 117!); Lake Rottnen (SVS!); Gräsmark, July 6, 1923, 1 specimen (SDN, MG!). Dlr Leksand, May 22, 1918 (TGR, VA!); Rättvik, May 17, 1918, June 14, 1936 (KLF); Mora, numerous (several collectors!); Orsa, June 1908 (UYT 1909, p. 297, and in litt.).

Erroneous: Vgl (UYT, according to NET and MEY, E.B. 1933, map.



Confused with specimens from Dlr, which UYT confirmed through personal correspondence). "Lappl." (1 specimen, coll. THS, MB! Definitely wrongly labeled).

*Norway*: Occurs only in the southern half of the country and markedly eastern. Though not without interruptions, the area is probably continuous or, at least, was originally. In the south near 2 Vikesund and Ringerike as well as several localities on the Glommen River between 10 Odal and Åmot (SIE 1875, p. 85). Then near 24 Sörem in Vågå and Lom (N.E.T. 1923, p. 255). Finally in Trondheim region: 27 Sokna in Stören; Orkedal (N.E.T. 1923, p. 276; 1937, p. 145); Melhus (N.E.T. 1937, l.c.); 28 Stjördal (LYS).

*Finland*: Found only in the Isthmus of Karelia, but numerous specimens and many localities (several collectors!), north as far as Kl Kexholm (THG!).

*Russian sector*: Only near Sv Vaaseni, 1942 (KRV!).

*Adjacent regions*: Absent in Denmark. In eastern Estonia and on Ösel (HAB in litt.); in Latvia several localities, particularly on the Gulf of Riga (MIK 1905; LBÅ 1932; LCK in litt.). Leningrad region (OBT 1876, BSK 1922, p. 54). British Isles, only at lake Lough Neagh in Ireland (JHS and HLB 1902, p. 587; LTH 1939a, p. 258).

*Total area*: Palearctic species. In Europe south as far as southern France (NET and MEY, E.B. 1933), northern Italy (LUI 1929, p. 58), Austria and northern Rumania (NET and MEY, l.c.). Northeast as far as Pechora (PPP 1907c, p. 307). Siberia (among others, SBJ 1880, p. 14; RM! NET and MEY, l.c.), east as far as Lena (PPP 1906b, p. 27) and (as "*conicolle*" Motsch.) probably as far as Amur (HEY 1880–1881, p. 52).

### Ecology

The behavior of this species is just the opposite of that of *B. andreae polonicum* insofar as it occurs in Scandinavia almost exclusively on river banks, while in eastern Fennoscandia it lives predominantly on the shores of the sea and of lake Ladoga (PME and PFF 1943, p. 132). In Dlr, however, it occurs on the banks of lake Siljan. On pure, fine-grained (according to KRG 1932, p. 163, Index 3.32–6.81), almost or completely barren sand. Lives at a greater distance from the water line than *velox* and hence in drier situations. Considered by KRG (l.c., p. 100) as a stenotopic shifting-sand insect in Finland; however along the Scandinavian rivers it also occurs on somewhat coarser material, not of the nature of shifting sands. In Central Europe likewise both on river banks and seashores, and rarely on lakesides (Dahl 1928, p. 55; GRD 1937, p. 40; HOR 1941, p. 116).

### Biology

The few dated catches known to me from Sweden and Finland were all made in



the months of May to July, with a pronounced maximum abundance in June (V: 2; VI: 15; VII: 5). It appears to be an early summer species, therefore, which probably hibernates as an adult.

Wings fully developed, but the apical part (as shown by KRG 1932, p. 185) not as well as in *velox*. The species is not quite as volant as the latter, but nevertheless a good flier and difficult to catch during strong sunshine.

*\*Bembidion (Trepanes) articulatum* Gyll.

Distribution

*Sweden*: South and central Sweden, but with a pronounced intervening gap. I. In Skå widely distributed, northernmost near Munka-Ljungby (NYH!) and Östra-Broby (NYH, ML!). Hll Vessige, 2 specimens (FGQ!). Ble Karlshamn, 1941, 3 specimens (SDH!). Små Kalmar (WLN, LG!). Öld (MRT, MG! certainly Halltorp region), Smedby, 1943 (BRK!); Hornsjön, 1939 (KLF! JNS). On Gtl several localities, also on Sandön (JNS 1925, p. 67!). II. Central Swedish area with the following delimiting localities: southward—Vgl Göteborg region (several localities and collectors!); Hjo, 1938 (KLF); Små Gränna region, two localities (Palm!); Hannäs, 1932, 1 specimen (LOH, according to JNS); Ögl Börrum, 1937, 1 specimen (WSJ!). Northward: Vgl Kinnekulle (leg.?, MG!); Gullspång, 1936, 2 specimens (LTH); Vst Järle, 1936 (JNS); Dlr Ludvika, 1 specimen (WSL!); Gst Hedesunda, 1941 (Palm!).

Erroneous: Lapland ("teste Prof. Sahlberg," ZTT 1828, p. 11; 1840, p. 28; GLL 1896).

*Norway*: Only in the southeast but in numerous localities and continuously. West as far as 4 Nes-Verk, north as far as 2 Ringerike and 12 Ringsaker.

*Finland*: Only in the south. Two subareas, the separation of which may possibly be only apparent. I. Southwest: Numerous localities on Åland as well as on the mainland, north as far as Ta Tammerfors region (several collectors!) and Jämsä (EHN, MH!); east as far as Nl Lapinjärvi (KNG). II. Southeast, west as far as Ka Jääski (THG!), north as far as Kb Kitee (PME).

*Russian sector*: Only at the Swir River in the extreme south: Sv Segesan-joki (PME! PFF); Uslanka and Kuujärvi (PFF); also at the Swir according to PPP (1899a, p. 11).

*Adjacent regions*: In Denmark widely distributed, including Bornholm, and 198 not rare (West 1940, p. 17). Estonia, widely distributed (RHL 1905; SUM 1931; Palm! HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 337).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 75), central Italy (LUI 1929, p. 67), European part of Turkey

(APF 1904, p. 110). Asia Minor and Iran (NET 1918, p. 24). The Caucasus (CHD 1846, p. 209; SDR and LDR 1878, p. 84). Kirgizia (HEY 1880–1881, p. 49). Siberia (among others, PPP 1907d, p. 7), east as far as Lena (PPP 1906b, p. 34). Japan (according to HOR 1941, p. 160).

### Ecology

Always on humid, loamy soil in the vicinity of stagnant or slow-flowing water bodies which are sometimes so small that they dry up during summer. In Sweden occurs in barren places or localities with patches of *Carex* and similar plants; in Karelia, contrarily (PME and PFF 1943, p. 140), predominantly on more richly overgrown river banks. Soil consists of loam, mixed with sand, gravel, gyttja†, or even peat, pure sand totally avoided. Tolerates moderate shade. Particularly prefers loam pits. Frequently found together with *illigeri*, and in the west with *nitidulum* also. The dependence of this species on loam has also been observed in Germany (GRD 1937, p. 42).

### Biology

Swedish catches: I: 1; II: 0; III: 1; IV: 2; V: 28; VI: 33; VII: 10; VIII: 11; IX: 2; X: 1. In Denmark too the maximum abundance is in June (LRS 1939, p. 324). Immature beetles in August from August 2 (Gst) to August 25 (Gtl). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. One specimen induced to flight upon exposure to sun under glass (Gtl, May 23, 1940). Spontaneous flight has been observed in Germany (GRD 1937, p. 76; HOR in litt.). Four specimens recovered from sea drift in Finland (PME 1944, p. 37).

### \**Bembidion (Diplocampa) assimilae* Gyll.

#### Distribution

199 *Sweden*: Partly in coastal region of the west and southeast, partly in the central Swedish lake region. I. On the west coast distribution apparently continuous. On the east coast, however, not reported to date from Skå. In Ble three localities: Mörrum (JNS); Nävrögöl and Karlskrona (SDH!). In eastern Små four localities: Kalmar (several collectors!); Smedby (WRN); Långemala and Hornsö (Palm). Frequent on Öld and Gtl, also found on Sandön (JNS 1925, p. 67!). In the actual inland of the south several localities in Skå and two

† (cf. page 69; suppl. scient. edit.).

localities on lake Bolmen in southwestern Små (1936 and 1940, LTH). II. Central Swedish region with the following delimiting localities: south—Vgl Kinnekulle, 1939 (JNS); Mariestad, 1936, numerous (LTH); Hjo, 1936, 1 specimen (LTH); Ögl Omberg region, frequent particularly on Lake Tåkern (Palm! LTH!); Norrköping, Svärtinge, 1926 (WSJ!); Sdm Rönninge, 1937 (JNS); Stockholm (BOH, 2 specimens, RM! 1 specimen, LF!). North: Upl Uppsala (several collectors!); Vst Västerås (SLL, VA!); Nke Örebro (JNS!); Vrm Skoghall, 1933, 1 specimen (Palm and LTH 1937, p. 118!); Ekenäs, 1933, 1 specimen (LTH).

*Norway:* Exclusively on the seashore of the south. In the southeast, west as far as 4 Kragerö, north right into the Oslo region (among others, SIE 1875, p. 88); also near 5 Mandal in the extreme south; and finally three localities in the southwest: 6 Risavika in Håland; Nedstrand; Jelsa (HLS 1915, p. 19). The existing gaps between these three regions might, perhaps, be explained by insufficient investigation.

*Finland:* Discovered in recent years. In the mainland found only near Nl Hangö, Täcktom, Rysshalm, June 11, 1936, 1 specimen among seaweed (BCK!). In sea drift material along the cliffs of Nl Tvarminne, 1939, numerous (PME, S.H.A. 1940, p. 81). Then near Al Jomala, Ytternäs (STK, PFF) and on four islands in the Skärgård, southeast of Åland (several collectors! HLL, N.E. 1937, p. 148).

*Russian sector:* No records.

*Adjacent regions:* In Denmark widely distributed, including Bornholm, and rather frequent (West 1940, p. 16). In Estonia on the coast as well as in the inland (HAB in litt.; KLF!); similarly in Latvia (ULN 1884; LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 337), also Ireland (JHS and HLB 1902, p. 582).

*Total area:* Palearctic species. In Europe south as far as central Spain (FUE 1919, p. 76), Corsica (DEV 1935, p. 27), southern Italy including Sardinia, Sicily (LUI 1929, p. 65), Greece (APF 1904, p. 111). Northern Africa (BED 1895–1914, p. 70). The Caucasus (SDR and LDR 1878, p. 84; LSH 1936, p. 139). Western Siberia (HEY 1880–1881, p. 48). Records from North America are erroneous (Leng 1920, p. 53; JEA 1941–1942, p. 467).

## Ecology

Almost exclusively a riparian species, most numerous along larger lakes or (exclusively in Norway and Finland) at the sea, more rarely at ponds or smaller rivers or in wet meadows. On more or less loamy but basically often sandy soil rich in *Carex*, *Phragmites*, and similar plants, and usually interspersed with small bald patches; absent on stony or gravelly banks and avoids mossy places. A species with a special affinity for humidity, it stays, usually gregariously, in the immediate vicinity of the water line, often under debris washed ashore,



and at the sea among seaweed. It tolerates only moderate shade. In Central Europe found more often than with us in swamp meadows or even in the forest (Dahl 1928, p. 63; GRD 1937, p. 42; HOR 1937, p. 20; 1941, p. 154). Dahl's contention (1925, p. 37) that it "evidently requires first and foremost water with a miniscule amount of salt" is hardly credible.

### Biology

Swedish catches: I: 1; II: 0; III: 1; IV: 9; V: 33; VI: 40; VII: 16; VIII: 16; IX: 13; X: 3; XI: 1. In Denmark maximum abundance already in May (LRS 1939, p. 325). Immature beetles from August 3 (Öld) to October (Ögl). Spring breeder, hibernating as an adult.

### Dynamics

The species exhibits wing dimorphism. Most of the Swedish specimens have fully developed wings, but brachypterous individuals incapable of flight are also present (even in the inland); the wings of the latter attain only half the normal width and the apical part is rudimentary and barely reflexed or not reflexed at all. The macropterous form has flight capacity. One beetle was induced to flight upon exposure to sunlight under glass (Gtl, May 1, 1940). Spontaneous flight was observed by HOR (in litt.) in the Rhineland. In Finland 10 specimens have been found in sea drift (PME 1944, p. 37).

### Fossil Records

Bavaria, glacial (FLH 1884, p. 7). Galicia, glacial (SCL 1916, p. 47). France, postglacial (LSN 1925, p. 948).

201

*\*Bembidion (Emphanes) azurescens* Wagn.  
(*tenellum* auct. nec Er.; see LTH 1939–1940, p. 89)

### Distribution

*Sweden?*: Only one single specimen (E.T. 1928, p. 216, "*tenellum*") purportedly from Sweden recorded. This specimen was found unlabeled in coll. SDN (MG!) in a box that ought to have contained animals exclusively from Hll Särö. In view of the distribution of *azurescens* in other parts of Europe, and especially the fact that the true *tenellum* Er. occurs exclusively in Denmark (sensu WGN) (West 1940, p. 16), it seems appropriate to consider this locality at least uncertain.

*Norway*: No records.

*Finland*: Only two localities in the southeast: Ik Uusikirkko, Vameljoki (KRG, N.E. 1925, p. 128; E.F.F. 1927, p. 8!); Kl Salmis, Uuksunjoki, June,



1938, 1 specimen (PME, N.E. 1938, p. 129).

*Russian sector:* Two localities on the lower reaches of the Swir: Segesan-joki, August 1942, 4 specimens (PME!), 1943 (PFF); Gorki, June 1875 (PPP 1899a, p. 10, "*tenellum*," MÅ!).

*Adjacent regions:* Absent in Denmark. In Estonia found near Pärnu by Palm (1943, p. 173!); Latvia, two localities (SDL 1891, p. 70, "*tenellum*"; LCK and MIK 1939, p. 52). Leningrad region (BSK 1908a, p. xxxviii, "*tenellum*").

*Total area:* Probably a Western Palearctic species. In Europe predominantly montane (in the Alps, Sudeten, Carpathians), south as far as southern France (DEV 1935, p. 27), southern Italy, including Sicily (LUI 1929, p. 66, "*tenellum*"). In Germany north as far as Silesia and eastern Prussia (HOR 1941, p. 158). East as far as Slovakia (ROU 1930, p. 127). The records of "*tenellum*" from Iran (BOD 1927c, p. 24), the Caucasus (SDR and LDR 1878, p. 84) and western Turkestan (HEY 1880–1881, p. 49) probably also belong here. However I do not know the source on which BUR (1939) has based his record from Siberia.

### Ecology

In eastern Fennoscandia, judging from the few observations, the species seems to be a stenotopic river-bank species, living on almost barren escarpments of fine-grained sand with a muddy surface layer (PPP 1899a, p. 10; PME and 202 PFF 1943, p. 139). In Central Europe predominantly montane but found also in the Danubian regions (MEY 1943, p. 287); in Hesse, 3 specimens "from a loess-clay pit" (HOR 1941, p. 158).

### Biology

There are no observations from our region on the period of development of this species. Since Rapp's "*tenellum*" (1933, p. 47) belongs, by and large, to this species, and was found in Thuringia even in January and February, it may be assumed that *azureus* hibernates as an adult, as do all related species.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*\*Bembidion (Philochthus) biguttatum* Fbr.

### Distribution

*Sweden:* Established with certainty only in Skå, but widely distributed there

in the western and central parts, and locally not rare. Southward as far as Håslöv, July 1889 (PTT, 3 specimens, LF!). Eastward as far as Krankesjön region (several collectors!); Ringsjön (several collectors!); and isolated near Önnestad (leg.?, 3 specimens, MG!). Northward as far as Herrevadskloster (Roth, E.T. 1896, p. 276); Hälsingborg, Gåsebäck, May 1942, 5 specimens (PLQ!); Rögle, June 5, 1943, 1 specimen (BRK!).

Doubtful: Vgl (GYL 1810, p. 28; in his "Fauna Suecica collection," MU, among "*biguttatum*" there are 2 specimens of *aeneum* and 1 specimen of *guttula*! On the other hand, in RM there is 1 specimen correctly identified: Vgl, BOH!).

Erroneous: Öld Eriksöre (WGR 1915, p. 82, = *aeneum*!).

Norway: Absent. The old record by SIE (1875, p. 88) is based on a large specimen of *guttula* (MST, N.E.T. 1933, p. 270).

Finland: In the southwest numerous localities, and continuously distributed, west as far as Ab Runsala (PHJ), north as far as St Loimaa (MER, MÅ!), east as far as Nl Lapinjärvi (KNG). Also near Nl Tvärminne in the extreme south, in sea drift in the Skärgård (Frey 1937, p. 436; PME 1944, p. 38). Isolated near Ka Koivisto, Vasikkasaari, 1938, 1 specimen (KNG!); Ik Kuokkala, June 5, 1938, 1 specimen (HLM, coll. STK).

Russian sector: No records.

203 Adjacent regions: In Denmark widely distributed and not rare (West 1940, p. 17), also on Bornholm (KLF! LOH). In Estonia and Latvia widely distributed (SDL 1891; RHL 1905; HAB and LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 336), also Ireland (JHS and HLB 1902, p. 581).

Total area: Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 77), central Italy, Sardinia, Sicily, Malta (LUI 1929, p. 68). Greece (OTZ 1886, p. 206). Northeast as far as Arkhangel'sk (HLL!). Madeira (LBL in litt.). The Caucasus (CHD 1846, p. 206). Kirgizia (HEY 1880-1881, p. 48). Western Siberia (among others, SBJ 1880, p. 48; RM! PPP 1907d, p. 7).

### Ecology

Moderate to very humid places, usually in the vicinity of small stagnant or slow-flowing bodies of water, but also in swamp meadows or humid forests. On humus soil, mostly with loamy subsoil. Always in more or less shady situations, among foliage, moss, etc. In Central Europe in identical biotopes (see Dahl 1928, p. 59), but also on marshy soil (ROU 1934, p. 79; HOR 1937, p. 25).

### Biology

Distribution of the few Swedish catches (Skå): III: 2; IV: 2; V: 11; VI: 4;

VII: 3; VIII: 2; IX: 3; X: 3; XI: 1. In Denmark, with more extensive material, maximum abundance in April to May (LRS 1939, p. 326). Immature beetle, September 4, 1924 (Skå). In Rumania larvae were found around June 1 (NET, E.B. 1926, p. 119). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Spontaneous flight observed in Hungary (HST, E.N. 1876, p. 79, "*vulneratum*"). Five specimens found in sea drift in Finland (Frey 1937, p. 436; PME 1944, p. 38).

### *\*Bembidion (Testedium) bipunctatum* L.

#### Distribution

*Sweden:* Found in all provinces with the exception of Nke, although not uniformly distributed. In central Sweden very rare and in the south (especially the southwest) occurs predominantly on the coast. Actual gaps in distribution may not exist, but in some regions the species is very rare and highly local, partly because of edaphic factors (see below), for example in Vrm and on the southeastern coast.

*Norway:* Rather uniformly and certainly continuously distributed throughout the country, occurring everywhere, both on the coast and in the inland. Northernmost localities: 37 Hammerfest (among others, SPS 1899, p. 147); 40 Tana (SPS, MST).

*Finland:* Frequent in the north and occurs everywhere as far as about latitude 65° N. Also widely distributed in the coastal region of the south. In the intervening region sparsely and unevenly distributed, and not found in the provinces of Tb and Sb nor on the coast between St Ytterö (ELF) and Om Pedersöre (STÅ). An actual gap may exist here.

*Russian sector:* In the west and along the southern coast of the Kola Peninsula continuously distributed, east as far as Lj Ponoj (PPP 1905, p. 89; MH!). In Karelia found near Kr Suma (PPP 1899a, p. 9; MH! FA!), and in the south, north as far as Kn Jalguba (PPP l.c.; MH!).

*Adjacent regions:* In Denmark rather rare but widely distributed; also found on Bornholm but almost exclusively on the coast (West 1940, p. 13). In Estonia exclusively on the coast including Ösel and Dagö, but frequent there (HAB in litt.). In Latvia found by several collectors in the Riga region, but contrarily not recorded to date in Kurland (LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 337), also Ireland (JHS and HLB 1902, p. 586). Faeröe Islands (West 1930, p. 11). Iceland (LTH 1931, p. 169).

*Total area:* Palearctic species. In Europe south as far as northern France (DEV 1935, p. 24) and montane as far as northern Portugal and Sierra Nevada (FUE 1919, p. 62), Corsica (DEV l.c.), central Italy (LUI 1929, p. 60), Greece



(OTZ 1886, p. 205). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 307), and in Kanin (PPP 1909, p. 6). Erroneously considered boreo-alpine by JEA (1941–1942, p. 525) (see HOR 1941, p. 123). Northern Africa (BED 1895–1914, p. 62). Asia Minor and Iran (NET 1921, p. 189). Syria (JEA l.c.). The Caucasus (NET l.c.). Western Siberia (SBJ 1880, p. 15).

### Ecology

205 An exclusive riparian species, but otherwise highly eurytopic. Occurs both at stagnant and flowing sweet waters and at the sea. On sand, gravel, rubble, and even loam-mixed soil; on barren banks, as well as those with dense but low turf of grasses or species of *Carex*, usually with a thin moss cover (not *Sphagnum*) underneath. Highly numerous on rubbly banks, mostly occurring together with *saxatile*, and in the north often with *prasinum* and *virens*. The most important requirement is hard ground; the species is totally absent in gyttja†, and generally very rare and sporadic on eutrophic lakes. In the *reg. bet.* of the fjelds often frequent; only one specimen has been found in the *reg. alp.* of Scandinavia (Lake Tol Katterat, 776 m above sea level; BRD 1934, p. 221); additionally in the eastern part of the Kola Peninsula (PPP 1905, p. 89). Also in Pechora and Yenisey regions in the tundra (PPP 1910a, p. 309). Predominantly alpine in the montane region of Central Europe (subsp. *nivale* Heer).

### Biology

Southern Swedish catches: IV: 1; V: 5; VI: 32; VII: 31; VIII: 13; IX: 4; X: 1. The decline in August is also evident in Denmark (LRS 1939, p. 322). Immature beetles found in southern Sweden between June 23 (Upl) and July 29 (Upl), in the north from July 6 (Mdp) and July 14 (Tol) to August 17 (Lul). In France larvae have apparently been detected in August and the pupae at the end of the same month (according to BLK 1925, p. 19). LRS (l.c., p. 377) assumes that the species hibernates exclusively as an adult. The same may hold true for the southern parts of our region, but considering the comparatively early dates of emergence in the north, it must be assumed that here, at least partly, hibernation in the larval stage also takes place. The larva is purportedly carnivorous (BLK l.c.).

### Dynamics

Wings fully developed. One specimen induced to flight by heating a room (Tol Abisko, July 13, 1939). Spontaneous flight observed near Abisko (July 8, 1939, KRG) and near Ks Paanajärvi (KNG).

†(cf. page 69; suppl. scient. edit.).



### Variation

In our region the species is structurally homogeneous (*forma typica*) and not represented in the fields by a form corresponding to the subsp. *nivale* Heer. On the other hand, it is extremely variable in color, especially in the north.

### Fossil Record

Galicia, early glacial (LMN 1894, p. 25).

206

### *Bembidion (Semicampa) chaudoiri* Chaud.

#### Distribution

*Russian sector*: Only near Kc Tschuja, among seaweeds on a small island in the White Sea, August 2, 1869 (SBJ, according to PPP 1899a, p. 11; 1 specimen, RM! 1 specimen, MH! 1 specimen, MÅ!). The report by JAC (1905–1908, p. 290) from Solovetsk Island is certainly based on the same record. Identification confirmed by NET (in litt.).

Absent in the rest of Fennoscandia as well as in adjacent regions and throughout Central Europe.

*Total area*: The area is very characteristically split, but probably not completely known. In Europe, outside Fennoscandia, known only from the Black Sea region (Odessa) (JAC 1905–1908, p. 290). According to ECH (1922, p. 32) also occurs in the northeastern part of Asia Minor. Doubtful in Kiev (JAC l.c.).

#### Biology

Nothing is known about the mode of life of this species. At least one of the specimens from Tschuja (August 2) was immature. It is therefore likely that hibernation takes place in the adult stage.

#### Dynamics

Wings (in 1 specimen from Tschuja, RM!) fully developed and certainly functional.

### \**Bembidion (Diplocampa) clarki* Daws.

#### Distribution

*Sweden*: Extreme south, with little continuity; found only on Öld and Gtl, in moderate numbers at some places. Skå Sandhammaren, seashore, June 1931, 1

specimen (Palm!); Trälleborg, 2 specimens (MLF, MG! ML!); Skanör, May 4, 1937, 2 specimens (Palm!); Lund (THS 1869–1895, pp. 124, 2389; 1 specimen, MG! 1 specimen, coll. RGS!); Örtofta, May 21, 1941, 2 specimens (NYH!); Ven, 1934, 1 specimen (Palm 1935, p. 9!). Ble Hällevik, June 23, 1935, 3 specimens (LOH!). Hll Åskloster, 3 specimens, Fjärås, 1 specimen (ERC, MG!). Små Kalmar (2 specimens, ERC, MG! several specimens, WLN, LG!). Öld and Gtl, several localities (several collectors!), the northernmost Gtl Boge, Tjelders, June 13, 1942, 1 specimen (BGW!).

207 Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rather rare, but moderately distributed in eastern Jylland and on the islands (excluding Bornholm) (West 1940, p. 16), northernmost near Aalborg (West in litt.). Absent in the Baltic States. British Isles (Joy 1932, p. 337), also Ireland (JHS and HLB 1902, p. 582).

*Total area:* Solely European species, recorded to date only in the west: Pyrenees (FUE 1919, p. 76), northern and western France (DEV 1935, p. 27), northwestern Germany (HOR 1941, pp. 154, 452; also specimens from Mark Brandenburg belong here: Briescland, MÜH!).

### Ecology

In humid, sparse deciduous forests or meadows of leaves, especially at ponds and puddles that often dry up in summer. The soil must be rich in humus and probably always with an admixture of loam. The species occurs among foliage and moss, in places more or less shaded by *Betula*, *Alnus*, or *Salix* bushes. A typical biotope is that described under *Acupalpus consputus* from Gtl Källunge. Occurrence on the sea certainly only accidental. In Central Europe the species is found in totally identical biotopes (WGN, E.M.D. 1915, p. 308; JEA 1941–1942, p. 466).

### Biology

Distribution of dated Swedish specimens: III: 3; IV: 3; V: 52; VI: 17; VII: 8; VIII: 2. In Denmark, with extensive material (LRS 1939, p. 325), the maximum abundance is likewise in May, followed by an abrupt decline at the beginning of June. It is certainly a spring breeder, hibernating as an adult.

### Dynamics

The species was hitherto thought to be constantly brachypterous (LTH 1939–1940, p. 90; 1942a, p. 105). I later saw three specimens from Sweden (Skå, Öld) with fully developed wings and certainly capable of flight, since the two specimens from Skå were found on the seashore, where they definitely appeared accidentally.

## Fossil Record

France, postglacial (LSN 1925, p. 948).

208

*Bembidion (Plataphodes) crenulatum ponojense* J. Sahlb.  
(see LTH 1939–1940, pp. 74–76)

## Distribution

*Russian sector*: The only known specimen assignable to the subspecies *ponojense* with complete certainty is the type specimen (male) from Lj Ponoj, August 1870 (SBJ 1873, p. 75; PPP 1905, p. 89; MH!).

*Total area*: There are also records of *ponojense* from Pechora (PPP 1907c, p. 308) and Ural (SBJ 1880, p. 20). Two specimens of the latter record (MH!) actually belong to *fellmanni*; the record should thus be verified. The true *crenulatum* F. Sahlb. has been described from eastern Siberia, Okhotsk (see LTH l.c.) and is also known from Kamchatka, and probably also from Alaska (NET 1935, pp. 22, 23). According to MKL (1881, p. 21) found in the Yenisey region, and according to PPP (1906b, p. 28) on the Lena. The insect reported from Lp under this name by HLL (N.E. 1929, p. 123) belongs to *fellmanni* (LTH l.c.).

## Ecology

The mode of life of *ponojense* is completely unknown.

## Dynamics

Wings fully developed in the type specimen and certainly functional.

*Bembidion (Peryphus) dauricum* Motsch.  
(*lysholmi* Munst., N.E.T. 1930, p. 353; see LTH  
1939–1940, p. 81; *pseudoproperans* Net.)

## Distribution

*Sweden*: Exclusively found in Tol in the Abisko region, where the species was first discovered by BRD (1934, p. 224!) who found eight specimens around 1930 in two places. Later, in July 1939, KRG and LTH found 12 specimens from two other places (Abisko and Mjellejokk). On June 6, 1938 another specimen was collected in the fjeld Pellemtjåkko (AGR, ML!).

*Norway*: Only the type specimen *lysholmi* known: 34 Melbo in Lofoten, July 1919, female (LYS; MST, N.E.T. 1930, p. 353!).

*Finland and Russian sector*: No records.

- 209 *Total area*: Palearctic species. Outside the region known only from northern Asia. Both *dauricum* and *pseudoproperans* were described from Baikal. Later found in Trans-Baikal (MDL 1931, p. 4), Lena region, near Verchojansk and Okhotsk, and northern Mongolia (LTH 1939–1940, pp. 81, 83).

### Ecology

In Abisko region only one specimen found in the *reg. alp.* (Pellemtjåkko); all the others recovered in the *reg. bet.* The species lives on a dry sandy moraine in fairly open situation (also see BRD 1934, p. 224). Most of the specimens (10) were found in the following biotope: Abisko, *Empetrum-Betula* forest, gravelly slope about 10 m high, northward at the head of an old gravel pit just south of the railway and east of Abiskojokk. Steep slope consisting of an almost dust-free mixture of fine-grained sand and small stones, almost devoid of vegetation (with only patches of stunted *Festuca ovina* and *Polytrichum*). The insect was found under stones and dried grass in the uppermost part of the slope (LTH).

### Biology

The Swedish specimens were collected in June, July, and August. Nothing can be said about the cycle of development.

### Dynamics

The 14 Scandinavian specimens studied are all distinctly brachypterous; the wing rudiment does not reach midlength of the elytron and lacks a reflexed apical part. In Asia, however, the species is dimorphic; three specimens from Verchojansk fully winged. Both forms exist in northern Mongolia (LTH l.c.).

\**Bembidion* (*Notaphus*, *Eupetodromus*) *dentellum* Thunb.  
(*flammulatum* Clairv.)

### Distribution

- Sweden: From Skå to Mdp and eastern Jtl occurs continuously but in no way uniformly distributed. In the extreme south and on Öld and Gtl very rare or, in part, probably only accidental. The apparent total absence along lake Vättern is surprising. In Skå five localities: Trälleborg (THS, 1 specimen, MB!), May 1869 (MLF, 1 specimen, MG!); Hälsingborg region, two localities, 1895, 1933 (VNS, ML! LGN!); Munka-Ljungby, 1936 (NYH!); Näsrum, June 1941 (Palm). Öld (MRT, 2 specimens, leg.?, 1 specimen, MG!), Halltorp, June 1921 (LTH). Gtl Gothen, June 20, 1934, 19 specimens (LOH, MG!), May 24, 1940, frequent near Gothenmsån (LTH); Källunge, May 23, 1940, 16 specimens (LTH). In



central Sweden especially frequent. Northernmost localities: Vrm Höljes, 1933 (Palm and LTH 1937, p. 117!); Dlr Mora (several collectors!); Orsa, June 1908 (UYT 1909, p. 297, and in litt.); Hls Ljusdal (SBJ); Hennan, June 23, 1943 (BGW!); Jtl Rangunda (FRI, 2 specimens, VA!); Bispgården (LTH and Palm 1934, p. 35!); Mdp Liden and Lidensboda, July 1937, numerous (BRC, RM!); delta of Indalsälven, June 1937 (BRC, RM!); Njurunda, July 1936 (LTH).

*Norway:* In the south numerous localities form a continuous area, west as far as 4 Grimstad, north as far as 16 Hiterdal (HLS 1891a, p. 9); 15 Teksle in Lyngdal; 2 Ringerike; 12 Eidsvoll (SIE 1875, p. 85); 10 Grinder in Solör. Three localities in the western part of the country quite isolated: 7 Sunde in Söndhordland (N.E.T. 1930, p. 338); 19 Frøtheim in Sogn (STA); Romsdal, 1934 (MST). Likewise, a small area in Trondheim region (N.E.T. 1937, p. 145); 27 Trondheim (N.E.T. 1923, p. 276!); Melhus; 28 Stjørdal; Steinkjer (N.E.T. 1923, l.c.).

*Finland:* Since the species was earlier confused with *tinctum*, its distribution is still not completely known. In the south (at least south of latitude 62° N) *dentellum* occurs as the only species. Northernmost localities, from which I have examined specimens: St Parkano (KNG!); Oa Malax, 1940, 1 specimen (LBÅ); Kb Kontiolahti, July 13, 1941 (KRG!). It is fairly certain however, that at least part of the records of "*dentellum*" made farther north (right as far as the Polar Circle) also belong here, but have not been verified to date. The material in the museums was not accessible given the prevailing conditions.

*Russian sector:* To date only one locality verified: Sv Kuujärvi 1943 (PFF!). Without doubt these two records also belong here: Sv Podporozze (RNK) and Ko Petrosavodsk (ENW, MH).

*Adjacent regions:* In Denmark established definitely only on Bornholm; an old record from Als is questionable (West 1940, p. 13). Estonia (HAB in litt.); Latvia (ULN 1884; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 338), also Ireland (JHS and HLB 1902, p. 586).

*Total area:* Palearctic species. In Europe south as far as southern France (DEV 1935, p. 21), northern Italy (LUI 1929, p. 60), Greece (OTZ 1886, p. 205). The Caucasus (SDR and LDR 1878, p. 85). Western Siberia (among others, SBJ 1880, p. 15; RM!). Records from Lena (PPP 1906b, p. 60) and Kamchatka (BNN, NET, SBR 1929, p. 4) require verification.

### Ecology

Exclusive riparian species, at stagnant or slowflowing, often quite small, bodies of water. Always on soft, highly loamy-muddy soil, in more or less shaded situations; thus it is found under *Salix* bushes, *Alnus*, and similar plants, frequently on completely barren soil, under foliage, twigs, etc., sometimes together with *Trechus rubens*. Contrarily, it does not seem to avoid somewhat mossy surfaces

(but never in *Sphagnum*). Notably hygrophilous, remaining just next to water. Its dependence on muddy soil has been confirmed many times from Central Europe also (E.B. 1927, p. 157; Dahl 1928, p. 70; GRD 1937, pp. 40, 68; HOR 1937, p. 11; 1941, p. 124). The absence of this species from lake Vättern is undoubtedly due to the mud-free water.

### Biology

Southern Swedish catches: IV: 6; V: 33; VI: 66; VII: 9; VIII: 4; IX: 4; X: 4; XI: 2. The data of LRS (1939, p. 322), origin not given (they may have originated at most partly from Denmark), reveals a more pronounced maximum abundance in early summer. Immature beetles found on July 25 (Boh), August 15 (Sdm), August 24 (Ab Lojo, numerous). It is certainly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Spontaneous flight observed in the Rhineland (HOR in litt.). Several specimens recorded in sea drift in Finland (PME 1944, p. 37).

*\*Bembidion (Plataphodes) difficile* Motsch.  
(*aeruginosum* auct. from Fennoscandia, nec Gebl.)

### Distribution

(map in HDH and LTH 1939, pl. VII)

*Sweden:* A species of the high boreal forest region. Southernmost or lowermost localities are: Vrm Höljes and Långflon, June 1933 (Palm and LTH 1937, p. 117!); Dlr Särna, Älvros, June 24, 1935, 1 specimen (KLF!); Hls Kårböle, on the Ljusnan River, September 13, 1943, 1 specimen (SJB!); Hjd Nean and Biskopsån, July 1936, July 1937 (WRN!); Jtl Bydalen, Dalsjön, August 1, 1941, 1 specimen (BGW!); Kyrkås, Brynje, July 14, 1933, 1 specimen (FHL!); Ragunda (FRI, several specimens, several collectors!); Bispgården, June 1930, numerous (LTH and Palm 1934, p. 35!); Mdp Lidensboda, July 1937, 6 specimens (BRC, RM!); Vbt Vindeln, June 23, 1930, numerous (LTH and Palm, l.c.!); Nbt Älvsbyn, June 18, 1930, frequent (LTH and Palm, l.c.!); Edeforsen, June 23, 1938, 9 specimens (LTH); Lul Pålkem, June 1941, July 1942, numerous (WRN!).

*Norway:* Partly in the lower fjeld regions of southern Varanger in the extreme northeast, right into the central south, 22 Geilo (STA!); partly in three localities farther down along the large southern rivers: 12 Biri (MO!); 10 Kongsvinger (N.E.T. 1933, p. 269); Jernbekken in Åmot (MO!). Finally in the coastal region near Trondheim (N.E.T. 1937, p. 145) and in the northern part of 34 Sortland in Lofoten (MO!) and northward. Actual gaps in distribution

might not exist; the seemingly largest, north of Trondheim region, is partly filled by Swedish localities in northern Jtl.

*Finland:* Only in the north and continuously distributed. Southernmost localities: Lk Kolari (SBJ, MH!); Ob Rovaniemi and Anttiköngäs (KNG!); Ks Kuusamo (Frey, MH!); Ok Ruhtinassalmi (SSK, MH!).

*Russian sector:* Only in the western and southern parts of Kola Peninsula, but apparently continuously distributed as far as Lj Ponoj (HLL!).

Doubtful: Ko Petrosavodsk (SBJ 1873, p. 75, "*fellmanni*"; the true *fellmanni* is out of the question here).

*Adjacent regions:* Absent.

*Total area:* Palearctic species. In Europe boreoalpine. The southern area includes only the Upper and Lower Tatra (HDH and LTH 1939, p. 136). In northern Europe, outside the region, near Mezen (PPP 1908, p. 5, "*fellmanni*"; MH!)<sup>13a</sup>; whether it occurs in Pechora region (PPP 1907c, p. 308, "*fellmanni*"; has not been established. Siberia: Kantaika (SBJ 1880, p. 20, "*fellmanni*"; MÅ!)<sup>13b</sup>; Baikal region (*locus classicus*).

### Ecology

Exclusive riparian species occurring quite predominantly along flowing waters, at large rivers as well as very small brooks, more rarely (and probably secondarily) on lakesides (e.g. Torneträsk) or at the sea (LBÅ 1933). The find from a birch forest (BRD 1934, p. 222) certainly only accidental. From *fellmanni*, an  
 213 ecologically closely related species with which it is only rarely found together (for instance, on the banks of Torneträsk), the species differs in its preference for places with a distinct loamy mud on the surface and moderate to strong shade of *Salix* bushes, *Alnus incana*, and similar plants. Otherwise the soil may consist of gravel, sand, or almost pure loam (LBÅ l.c.; PFF, N.E. 1942, p. 50). Vegetation quite sparse, sometimes almost lacking, and usually consists of grasses and species of *Carex* interspersed with very fine moss (never *Sphagnum*) (N.E.T. 1932, p. 25). Usually lives right next to water. This species is found in the high boreal coniferous forest region, indeed is also sometimes frequent in the *reg. bet.*, but occurs only sporadically and in most cases probably accidentally in the *reg. alp.*: Hjd (Nean, WRN!), Norway (HDH and LTH 1939, p. 137), Finland (PFF l.c.), Kola Peninsula (Ponoj).

### Biology

Most of the Swedish catches have been made in June and July. In northern Norway (Målselv) immature beetles have been collected at the end of August (N.E.T. 1932, p. 25). The species thus hibernates, at least in part, as an adult.

<sup>13a-b</sup> Due to examination of genitalia.



## Dynamics

Wings fully developed. Spontaneous flight observed near Tol Abisko, July 20, 1939 (LTH).

*\*Bembidion (Trepanedoris) doris* Panz.

Distribution

(map in NET and MEY, E.B. 1933)

*Sweden:* Found in all provinces except Hjd and, except for the fjelds, distributed continuously and almost uniformly throughout the country. Its absence in the greater part of Hll is certainly only apparent. The highest or northernmost localities are: Vrm Vingäng, 1933, frequent (Palm and LTH 1937, p. 118!); Dlr Lima, repeatedly found (OLS! TJB!); Älvdalen (HGL, coll. JNS!); Hamra (SJB); Hls Los (SJB); Jtl Svenstavik, 1943 (LND); Frösön, 1936, 3 specimens (LTH); Ång Täsjö, 1939 (BRC, RM!); Hoting, 1936, 5 specimens (LTH); Åsl Åsele, Dorotea and Vilhelmina, 1936, 3 to 6 specimens each (LTH); Lyl Lycksele, 1936, 4 specimens (LTH); Sorsele, Gargnäs 1928, 3 specimens (GTZ, E.T. 1932, p. 49!); Pil Skatt-träsk, 1931 (PRS, ML!); Nbt Edeforsen, 1938, numerous (LTH); Lansjärvi, 1938, 4 specimens (LTH); Pajala, 1938 (JNS),  
 214 Erkheikki, 1938, 1 specimen (LTH); Lul Pålkem, 1941, 5 specimens (WRN!); Porjus, 1928, 2 specimens (GTZ!). Searches near Vittangi (Tol) at very appropriate biotopes in 1938 proved futile (LTH).

*Norway:* I. In the southeast frequent and very widely distributed, west as far as 5 Lyngdal, and, in spite of the small gap thereafter, probably occurs continuously right into the southern parts of the western country. Northernmost localities: 7 Os and Stend in Fana (N.E.T. 1930, p. 338); 14 Fagernes; 13 Fron. II. Between Trondheim (N.E.T. 1923, p. 276; 1937, p. 145) and 29 Fellingsfoss (LYS, according to STA), six localities, forming a subarea that lies closer to the Swedish area than to the southern Norwegian.

Doubtful?: 38 Alta, Bossekop (CHM, E.M.M. 1890, p. 72); 41 Svanvand in Pasvik (PPP). In his catalog MST has marked both these records with a "?" and, in the case of the record from Alta, explicitly indicated (N.E.T. 1921, p. 91) a misidentification. The authenticity of the record has however become more credible through the study of one specimen from 36 Nordreisa (STE, MB!). The species is very easy to identify.

*Finland:* Except for Le and the northernmost parts of Li distributed throughout the country, with no identifiable gaps. Northernmost localities: Lk Muonio (SBJ 1873, p. 87; RNK; MER, MÅ!); Li Ivalo (PPP 1905, p. 91; MH! KRV!); Lp Lutto region, two localities (PFF, N.E. 1942, p. 66); Liinahamari, 1939 (STN).

*Russian sector:* Two localities in the southwestern part of Kola Peninsula (PPP 1905, p. 91; MH!). Also in northernmost Karelia: Kk Soukelo (PPP l.c.;



MH!) and on Solovetsk Island (EDG, coll. LTH). In southern Karelia widely distributed, north as far as Kr Suma (PPP 1899a, p. 11; MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm), but not frequent (West 1940, p. 17). Estonia, including Dagö, widely distributed (HAB in litt.; Palm!); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 337), also Ireland (JHS and HLB 1902, p. 582).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 75), central Italy (LUI 1929, p. 67), Bosnia (APF 1904, p. 110), Transylvania (PTI 1912, p. 17); becomes rare toward the south. Kirgizia (HEY 1880-1881, p. 49). Siberia (among others, SBJ 1880, p. 19; RM!), east as far as Baikal (HEY l.c.).

### Ecology

215 Exclusive riparian and swamp species but highly eurytopic. Found at stagnant and flowing waters, including the largest and smallest water bodies, also in ditches and moors, in which there is no visible water during summer; on the seashore, however, it seems to occur only accidentally. On loam, dry, or peat; also in sandy, gravelly, or stony places where an admixture of mud occurs. Principal requirement, presence of some vegetation (see also PME and PFF 1943, p. 140), usually species of *Carex* and *Eriophorum*, generally also a distinct moss cover (*Amblystegium* and such, also *Sphagnum*), and hence frequent in marshy land. Only in prominently shaded biotopes, e.g., deciduous forest swamps, does it tolerate completely barren soil where it lives under wet foliage. At dystrophic bodies of water it is often the sole *Bembidion* (together with *Pterostichus diligens*), and attains maximum frequency; also at oligotrophic waters; rarely found at markedly eutrophic waters. The eurytopic nature of the species has also been emphasized in Germany (HOR 1937, p. 24; GRD 1937, p. 42). Farther south the species seems to be a distinct forest insect (JEA 1941-1942, p. 469).

### Biology

Southern Swedish catches: III: 4; IV: 8; V: 57; VI: 104; VII: 33; VIII: 16; IX: 7; X: 1; XI: 2; XII: 2. In Denmark also a prominent spring species (LRS 1939, p. 381). Numerous immature beetles from July 13 (Små) to August 15 (Små). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight upon exposure to sun under glass (Nbt Luleå, August 6, 1939). Spontaneous flight: Jtl Revsund, June 7, 1943 (BGW); Ks

Paanajärvi (PFF 1943, p. 121); NI Tvärminne (PME 1944, p. 133). In the last mentioned locality it was demonstrated that this carabid flies away from gradually drying biotopes as a means of self-preservation. Extremely frequent in sea drift in Finland (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37).

### Variation

More or less distinctly rufinous specimens ("aberration *aquaticum* Panz.") occur here and there among normal ones. They exhibit no geographic concentration but, contrarily, possibly an ecological one (found at darker places).

216

\**Bembidion* (*Plataphodes*) *fellmanni* Mannh.  
(*palméni* J. Sahlb.; *crenulatum* Hellén, N.E. 1929, p. 123,  
nec F. Sahlb.)

### Distribution

(map in HDH and LTH 1939, pl. VII)

In view of the late separation of *fellmanni* and *difficile*, the earlier records in literature can only be used after re-examination of voucher specimens.

*Sweden*: Exclusively in the fjelds, in Hjd-Jtl and northern Lapland. Delimiting localities: Southern region—Hjd Nean, 1936, 1937, numerous (WRN!); Jtl Undersåker, July 1932 (RNG, ML!); Duved (SDN, MG!). Northern region: Pil Mavasjaure and Pjeskejaure, 1925 (LTH 1935a, p. 39!); Lul Sarek, several localities (JNS 1926, pp. 902, 908! LTH); Njunjes and Tarra near Kwickjock, 1924 (LTH l.c.!); Tol Kebnekaise region, several localities, 1941 (BGW!); Abisko region, frequent (several collectors!), easternmost near Kaisepakte (Holm! LTH). Surprisingly the species is totally absent in northern Jtl.

*Norway*: I. In the southern fjelds numerous localities, especially in Jotunheimen and Dovre; also two localities in Röros region (MO!). Southernmost locality, 21 Bleskestadmoen in Suldal (N.E.T. 1933, p. 269) isolated; the species may not be actually missing in province 22 (Hardangervidda). In the Trondheim region one locality (probably accidental) on the coast: 28 Hell in Stjördal (N.E.T. 1937, p. 145). II. In the north probably continuously distributed from 31 Mosjøen (N.E.T. 1933, p. 269) and 32 Rössvatn (STE, MO!) as far as southern Varanger, but absent in the outer Skärgård, e.g., in Lofoten.

*Finland*: Only in the high north; not reported to date from Le but certainly not absent. Southern localities: Lk Muonio (SBJ, MH!); Kittilä (SAD, MH! KRG); Ks Salla (KRG).

Doubtful: Ks Paanajärvi (KRG, according to HDH and LTH 1939, p. 135; no voucher specimen). Ok Ruutinassalmi (1 female, ELF! A confusion of localities may have occurred here).

*Russian sector:* Only in the western and southern parts of Kola Peninsula, possibly continuously distributed as far as Lj Ponoj (ENW, MH!).

*Adjacent regions:* Absent.

- Total area:* Palearctic species. In Europe boreo-alpine. Southern area embraces only the eastern parts of the Transylvanian Alps (HDH and LTH, l.c.).  
 217 In northern Europe, outside the region, found with certainty only along the Asian border: northern Ural (BGR, male, identified after preparation of genitalia; MH!). Undoubtedly also in Siberia (in view of the earlier records from there, also see *difficile*).

### Ecology

Predominantly on banks, at brooks and smaller rivers, as well as on lake-sides, and even at the sea (LBÅ 1933, p. 116, 118). On gravelly or rubbly banks, less often on sandy banks, which are usually completely barren and open. Right next to water, regularly found together with *hasti*, and less often with *difficile* (see description of this species). Additionally, in the Abisko region (Tol) and in large numbers on the humid *Trollius* meadows of the lower *reg. alp.* (BRD 1934, pp. 89, 221); also at the edge of large snowdrifts (LTH). This is a true fjeld species, which reaches its maximum frequency in the lower *reg. alp.* and in the *reg. bet.*, but attains an altitude of only up to about 1,000 m above sea level (Tol Kebnetjåkko, BGW!). In the tundra of the Kola Peninsula (Ponoj). From the highest parts of the coniferous forest region in Sweden there are only sporadic records (Jtl Handöl; Lul Aktse and Salto; LTH).

### Biology

Most of the Swedish captures have been made in July (remainder only in June and August). Immature beetles were found on July 22 (Hjd) and August 22 (Lul). Hibernates unquestionably in the adult stage; it is not known whether the larvae hibernate concomitantly.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### Fossil Record ?

An elytron of *Plataphodes*, which is not identifiable further, was found in the glacial deposits of Galicia (see HDH and LTH 1939, p. 137).



*\*Bembidion (Peryphus) femoratum* Sturm.

Distribution  
(map in LTH 1941, p. 439)

218 *Sweden*: In south and central Sweden quite continuously but sparsely and somewhat irregularly distributed. Not found to date on Öld. Northern boundary of the main area seems to extend into Ång-Jtl. Delimiting localities northward: Dlr Idre, June 26, 1935, 1 specimen (KLF!); Hls Kårböle, Strandbodarna, July 1, 1942, 3 specimens (LBL, RM!); Jtl Åre, June 1840 (ZTT, 1 specimen, ML!); Ulriksfors, July 26, 1936, 1 specimen (LTH); Ång Undrom, June, 1939, 1 specimen (BRC, RM!); Vbt Umeå, July 10, 1936, frequent (LTH). Farther north an isolated locality: Nbt Boden, August 15, 1918, 6 specimens (SLL, RM!).

*Norway*: Distinctly bicentric. I. In the south continuously distributed as far as Trondheim and in the valleys extending deep into the interior. Found in the true western part of the country, but only in two localities: 7 Bergen, August 18, 1937, 1 immature specimen (KLF!); 20 Veblungsnes (MO!). Northernmost localities: 27 Trondheim (N.E.T. 1937, p. 145), 1933 (LBÅ!); 28 Hell in Stjördal and Meraker (N.E.T. l.c.). II. Northern area continuous and extends from 34 Svolver (JEN, according to STA) as far as 39 Karasjok (MST, MO!); found both on the coast and in the valleys; total of 11 localities (in addition to one in the Finnish region).

*Finland*: I. In the south very local and generally rare, but probably continuously distributed from Ab Villnäs (MNH, MH!) as far as the Russian border. Northernmost localities: Ta Tammerfors (KNG; MER, MÅ!); Padasjoki (MK, according to HLL); Sa Kristina (RNK); Kb Kitee and Liperi (PME!). II. In the north three isolated localities, of which the northernmost is directly connected with the Norwegian area: Ob Pudasjärvi (ENW, 4 specimens, MK!); Lk Pelkosenniemi, 1937, 1 specimen (STN!); Li Tenojoki (PPP 1905, p. 90; 3 specimens, FA!).

*Russian sector*: Four localities in southern Käreliä, north as far as Kn Jalguba (PPP 1899a, p. 10; MH!).

*Doubtful*: Two localities in the eastern part of Kola Peninsula (PPP 1905, p. 90; no voucher specimen).

*Adjacent regions*: In Denmark widely distributed (although apparently missing on Bornholm) and not rare (West 1940, p. 15). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 340), also Ireland (JHS and HLB 1902, p. 585).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 67), southern Italy including Sicily (LUI 1929, p. 62); Transylvania (PTI 1912, p. 16). Northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308). Asia Minor (ECH 1922, p. 31). The Caucasus (CHD 1846,



- 219 p. 202; ECH 1930a, p. 145). Siberia (among others, SBJ 1880, p. 19; RM!), east as far as Lena (PPP 1906b, p. 30). Northern Mongolia (PPP 1907d, p. 7).

### Ecology

This species is less dependent on proximity to water than the other maculated species of *Peryphus*. It is indeed most frequent on shores, especially of rivers, but also at lakes and the sea; however, additionally found in gravel, sand, and loam pits, as well as in open fields even in the city center. The biotope is distinguished primarily by very sparse vegetation, is often totally barren, and distinctly dry on the surface. Loamy soil is preferred, and I suspect that even in cases of apparently pure sand or gravel, there is an underlying layer of loam. In Central Europe the species occurs in completely identical situations, on river banks (HOR 1937, p. 16; MEY 1943, p. 282), at the sea (GRD 1937, p. 66), and primarily in loam pits (l.c.). In the *reg. alp.* the species seems absent in the northern Scandinavian area too; on the other hand, found in Siberia in the tundra (SBJ 1880, p. 19; PPP 1906b, p. 30; 1910a, p. 312).

### Biology

Southern Swedish catches: I: 1; II: 0; III: 1; IV: 2; V: 12; VI: 36; VII: 19; VIII: 11; IX: 8; X: 2. In Denmark too maximum abundance in June, but also markedly numerous in September (LRS 1939, p. 323). Very numerous immature beetles already found from June 24 (Vrm) to September 9 (Små). The species is largely a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. One specimen was induced to flight upon exposure to sun under glass (Gtl, May 30). Spontaneous flight observed in the Rhineland (HOR in litt.) and in Mecklenburg (GRD in litt.).

### Systematics

As to whether *femoratum* should be considered a separate species or a subspecies of *andreae* (LTH 1939–1940, p. 88) can best be decided after a thorough revision of the entire group.

### Fossil Record

Denmark, late glacial (HNR 1933, p. 127) "identified with complete certainty" (l.c., p. 291; translated from Danish).

- 220 *Bembidion (Chrysobracteon) foveum* Motsch.: This species was erroneously reported from Finland, Ik Metsäpirtti (HLL 1921a, p. 33), but later contravened (N.E. 1934, p. 53). It is a Siberian species, which has been established in the west as far as the Pechora region (SBJ 1898, p. 338; LTH 1939–1940, p. 70).

*\*Bembidion (Diplocampa) fumigatum* Dft.

Distribution

*Sweden:* Exclusively in southwestern Skå, but only three localities: Kämpinge (PTT), July 1887 (LF!), June 1888 (MG!); Kungstorp, August 7, 1936, 2 specimens (Palm! LTH); Malmö (VNS, according to THS 1869–1895, p. 1029), June 1881, 1 specimen, August 1882, 3 specimens (HM!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark more widely distributed, both in Jylland and on the larger islands, but rather rare (West 1940, p. 16), and near Ølene on Bornholm (West in litt.). Absent in the Baltic States. British Isles (Joy 1932, p. 337).

*Total area:* Palearctic species. In Europe predominantly on the coast, south as far as central Spain and the Balearic Islands (FUE 1919, p. 76), Corsica (DEV 1935, p. 27), central Italy (LUI 1929, p. 65), Albania (APF 1904, p. 111). East as far as Pomerania (HOR 1941, p. 153), Slovakia (ROU 1930, p. 126), Hungary (KTY 1900, p. 28), central Russia (JAC 1905–1908, p. 290). The Caucasus (JAC l.c.; LSH 1936, p. 139). Kirgizia (JAC l.c.). Western Turkestan (HEY 1896, p. 10). Siberia (MÜL 1918, p. 63).

Ecology

In Skå found exclusively at the sea, in the same places where *Anisodactylus poeciloides* lives; in Denmark too found together with the same species (SDT 1870, pp. 405–406). However, in both Denmark and Central Europe the species also occurs in the inland and not exclusively in saline situations (SDT l.c.; HOR 1941, p. 153). It is thus indeed distinctly halophilous, but not a halobiont as stated by LNG (1929, p. 17). It lives predominantly in open, wet beach meadows (GRD 1937, p. 63), less often at ponds in rather shady situations (SDT l.c.; D.E.Z. 1924, p. 30).

Biology

- 221 The six Swedish collections were made from June to August. In Denmark it is a predominantly spring species, found in large numbers already in February with maximum abundance in April (LRS 1939, p. 325). It must therefore be a spring breeder, hibernating as an adult.

## Dynamics

Wings fully developed. Spontaneous flight observed in the Caucasus (LSH 1936, p. 139).

\**Bembidion (Semicampa) gilvipes* Sturm.

## Distribution

*Sweden*: In southern central Sweden unevenly but certainly continuously distributed. The species is markedly local, sometimes occurring only sporadically, and hence the existing gaps may be largely only apparent. Surprisingly, absent in eastern Skå. Northernmost localities: Dlr Leksand, and Rättvik, 1936 (KLF); Svärdsjö, 1937 (KLF!); Gst Storvik, 1935 (JNS, Palm); Mårdängssjön, 1937 (Palm); Hls (STH, 2 specimens, MG!), Ljusdal and LOS (SJB); Jtl Revsund, June 22, October 5, 1941 (BGW!); Ång Långsele, June 5, 1930, 2 specimens (LTH and Palm 1934, p. 36!).

*Norway*: Only in the southeast, total of 13 localities, west as far as 2 Juvarn in Ringerike (MO!), north as far as 13 Fåberg; 12 Biri and Ilseng; 10 Elverum (SIE 1875, p. 88).

*Finland*: In the southern and central parts continuously distributed, especially frequent in the southwest and in Ta province. Also on Åland: Eckerö, 1 specimen (PFF!). Northernmost localities: Oa Ilmajoki (PHJ!); Ib Viitasaari (LBG); Sb Kuopio (MH!); Kb Kontiolahti (LBG!); Eno (THG).

*Russian sector*: To date found only near Ko Petrosavodsk (SBJ 1873, p. 83; MH!).

*Adjacent regions*: In Denmark rare but widely distributed, also on Bornholm (West 1940, p. 15). Estonia (SDL 1872; HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 341), also Ireland (JHS and HLB 1902, p. 583).

*Total area*: Palearctic species. In Europe south as far as central France (DEV 1935, p. 27), the Pyrenees (FUE 1919, p. 74), northern Italy (LUI 1929, p. 65), Hungary (KTY 1900, p. 28). Siberia (SBJ 1880, p. 19; RM! PPP 1907d, p. 7), east as far as Lena (PPP 1906b, p. 34).

## Ecology

This species exhibits a peculiar "dual" occurrence: Partly on rather humid, moderately shaded, more or less loamy deciduous forest soil or meadows (frequently, but not always, in the vicinity of banks) in moss, among foliage, under bark, and similar situations, especially under *Alnus glutinosa* and shrubs of *Salix*; and partly on flat, open, sometimes entirely barren banks of lakes or at the sea. In spite of the fact that the species often occurs in the latter biotope in exceptionally large numbers, these might well be specimens which have

strayed and the species would not survive in such places. All such specimens studied to date were macropterous. Both the biotopes described are likewise inhabited by this species in Central Europe (see West 1940, p. 16; Dahl 1928, p. 67; PTZ 1936, p. 38; GRD 1937, p. 42; HOR 1941, p. 151).

### Biology

Swedish catches: III: 3; IV: 14; V: 31; VI: 31; VII: 6; VIII: 6; IX: 12; X: 4; XI: 4. In Denmark maximum abundance already in April (LRS 1939, p. 324). Numerous immature beetles from August 15 (Sdm) to September 4 (Gtl). A spring breeder, hibernating as an adult.

### Dynamics

The species exhibits wing dimorphism. In the brachypterous form, apparently more frequent with us, the wings are reduced to narrow pointed rudiments, equal in length to about one-fifth the elytron. The macropterous form has fully developed wings and has undoubtedly flight capacity, even though direct observations of such have not been recorded to date. The species has been found in large numbers in sea drift near Nl Tvärminne (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37).

### Fossil Record

France, postglacial (LSN 1925, p. 948).

*\*Bembidion (Peryphus) grapei* Gyll.  
(*sahlbergi* Dej. nec Zett.)

### Distribution

223 *Sweden*: A northern species, continuously distributed in the high boreal forest region of Norrland, but yet has not reached the coast of the Gulf of Bothnia in the north. Southernmost or lowermost localities are: Dlr Idre (AND, 2 specimens, LF!). Storsåtern, June 27, 1937, 1 specimen (KLF!); Hamra (SJB); Hls Los, many specimens, repeatedly (SJB! Palm); Jtl Revsund, 1941, 1 specimen (BGW!); Ång Ruske and Tjärn, 1939, 1 specimen each (BRC, RM!); Pil Arvidsjaur, 2 specimens (RGS!); Nbt Edeforsen and Harads, 1938, 1 specimen each (LTH); Över-Kalix, 1 specimen (AGR!).

Erroneous: Nbt Luleå (BOH 1844, p. 96; 1 specimen "Botn. sept.", RM = *difficile*!).

*Norway*: I. In the southern half only five scattered localities: 5 Sirdal (Tjötta, according to HLS 1915, p. 18); 6 Viglesdalsvatn in Årdal (JEN, according to HLS l.c.); 24 Sörem in Vågå (MST, 2 specimens, MO!); 27 Mel-



hus (N.E.T. 1937, p. 145); Trondheim (LYS, MO!). II. In the north, from 30 Hattfjelldal (STE, MO!) and 31 Mosjöen (LYS) as far as southern Varanger probably continuously but rather unevenly distributed, also at the coast. Absent in the peninsulas north of latitude 70° N; northernmost localities in 38 Alta (very numerous specimens, among others in MO!).

*Finland:* Except for the western coastal regions, found in all parts of the country, but very unevenly distributed, and in the southern half very rare throughout. I. Extreme southwest, several localities north as far as St. Yläne (SBJ 1873, p. 81; 1 specimen, MH!), east as far as Ab Lojo, 1895, 1 specimen (STN!); NI Helsinki, Mejlans (SBJ l.c.). Also in Al Kökar, Idö, 1939, 1 specimen (STK!). II. Southeast: Ka Kirjola (SBJ l.c.; 1 specimen, MH!); Ik Kuolemajärvi (SCK, 1 specimen, coll. LBG!); Kl Salmis, 1938, 1 specimen (PME!). III. North, somewhat more numerous (although not found to date in Le) and in the interior sparsely but probably continuously distributed as far as almost latitude 62° N. Southernmost localities: Om Haapavesi (HEL, 2 specimens, N!); Tb Laukaa (EHN, MÅ!); Sb Kuopio (Westerlund, MH!), 1943 (ELF); Kb Juuka, 1940 (KRG!).

*Russian sector:* Two localities in the western part of the Kola Peninsula (PPP 1905, p. 90; MH!); in Karelia near Kc Uhtua (HDL); Lake Kr Wig (PPP 1899a, p. 10; 2 specimens, MH!); Kn Karhumäki, 1942, 1 specimen (PRT!); and four localities in the south as far as just north of the mouth of the Swir, 1942, 2 specimens (KRH, N.E. 1943, p. 163!), 1943 (PFF).

Erroneous: Lj Ponoj (PPP 1905, p. 90, = *grapeioides*, MH!).

*Adjacent regions:* Absent in Denmark and the Baltic States. On the other hand found in Leningrad region (OBT 1876; BSK 1929, p. 146). Iceland (LTH 1931, p. 169).

224 *Total area:* Circumpolar species. In Europe, outside the region, only in northern Russia: Mezen region (PPP 1908, p. 5); Pechora (PPP 1907c, p. 308). Siberia (SBJ 1880, p. 17; MKL 1881, p. 21; PPP 1910b, p. 6; LTH 1939–1940, p. 83), east as far as Kamchatka (BNN, NET, SBR, 1929, p. 3). North America (*nitens* Lec.; LTH 1931, p. 170; 1939–1940, p. 82); Alaska (PPP 1910a, p. 313). Greenland (HNR and LBK 1917, p. 485).

### Ecology

This species is not associated with banks (the record by PPP 1905, p. 90, is erroneous). It lives on more or less loam-mixed, fine-grained sand, only slightly humid on the surface, and overgrown predominantly with very fine moss and often with *Festuca ovina*. Always with some shade, for instance forest fringe or northern slopes (also according to KRG 1937, p. 294), and sometimes in sand pits (N.E.T. 1932, p. 25). Almost obligatory successive species are *Miscodera* and *Trichocellus cognatus*. An inhabitant of the high boreal forest region, it occurs with us in the *reg. bet.* (e.g., Tol Abisko), often in large numbers, but

has not been observed to date above the timber line. Contrarily, this species has been found in the *reg. alp.* in Siberia and Alaska (PPP 1910a, p. 313) and in Greenland (HNR and LBK 1917, p. 485).

### Biology

In Sweden this species has been recorded from April to September, with a maximum abundance in June–July. Numerous immature beetles found from July 26 (Jtl) to August 24 (Lul). The species certainly hibernates as an adult. In Greenland adults and larvae found together (E.M. 1891, p. 188). Possibly in the north development requires two years.

### Dynamics

Wing dimorphism evident. The brachypterous form, usually seen less often, lacks a reflexed apical part and the wing rudiment is at most two-thirds the length of an elytron. Some individuals exhibit the external appearance of the brachypterous form in flatter and posteriorly more acuminate elytra. The macropterous form has fully developed wings and is certainly capable of flight. No flight observations recorded to date, however, but two beetles were found in sea drift in Finland (STA 1938, p. 18; PME 1944, p. 37).

225

### Fossil Record ?

Finland, Ik, postglacial “Dryas zone” (PPP 1911, p. 36). Since only a single elytron was recovered, identification questionable.

\**Bembidion (Peryphus) grapeioides* Munst.

(N.E.T. 1930, p. 354; *sahlbergioides* Munst., N.E.T. 1932, p. 80; see LTH 1939–1940, p. 79)

### Distribution

*Sweden*: Exclusively in Tol. First discovered by BRD (1934, p. 223!) near Björkliden, 10 specimens; later, July 1939, 1 specimen, found again at the same place by KRG (coll. LTH). Then in Kebnekaise region on the bank of the Ladtjojokk close to the Tourist House, July 13, 1941, 1 male (BGW!).

*Norway*: Only in the extreme north on the coast of the Polar Sea: 38 Kå Fjord in Alta, June 1907, male (MST; MO!); Brennelv in Porsanger (JEN, according to STA); 41 Neiden in southern Varanger, July 1901, several specimens (SPS; MST, N.E.T. 1930, p. 354; MO!); Kirkenes, 1 specimen (STA!).

*Finland*: Only in the extreme north near Yläluostari in Petsamo, but then numerous specimens by several collectors(!).

*Russian sector:* To date found only near Lj Ponoj, August 20, 1870 (PPP 1905, p. 90, "grapei"; MH!).

No records from the rest of Europe.

*Total area:* Palearctic species. Outside the region, only one male known from Siberia, Yakutsk (LTH 1939–1940, p. 82).

### Ecology

The few observations provide only a very incomplete picture of the mode of life of this species. Near Lp Yläluostari it has been collected in large numbers along the Petsamojoki, from the steep loamy bank slope dripping with water (STN and KRV in litt.). Near Tol Kebnekaise, another specimen found on a similar river bank. Contrarily, near Tol Björkliden found on an *Eriophorum* grass moor as well as on open moraine ground (BRD 1934, p. 223). Like *grapei*, therefore, it does not seem dependent on banks, but whether it is dependent on loam has not yet been ascertained. The specimen from Tol Kebnekaise was found just above the timber line, and the material from Lj Ponoj found in the tundra region; all other specimens were collected from the *reg. bet.* In any case it is predominantly a fjeld species.

### Biology

The Fennoscandian specimens were collected from June to August, most of them in July. Nothing can be stated concerning the cycle of development.

### Dynamics

This species also exhibits wing dimorphism. In the brachypterous form the wing rudiment is actually somewhat variable in size (LTH 1939–1940, p. 79), but always lacks a reflexed apical part. The macropterous form has fully developed wings and is certainly capable of flight. Of this form I have to date seen only one specimen each from Tol Abisko and Kebnekaise, as well as from Siberia.

*\*Bembidion (Philochthus) guttula* Fbr.

### Distribution

*Sweden:* Widely but rather irregularly distributed, locally very frequent. In southern and central Sweden found almost everywhere, but more frequent in the coastal regions and at large lakes. Northward distributed in the plains close to the coast, as far as the Finnish border; here, however, possibly a gap occurs in northern Vbt. Northernmost or highest localities are: Vrm Uddeholm (SJB); Dlr Mora, Siljansfors, 1928 (FRL!); Rättvik, 1936 (KLF); Hls Los, 1943 (SJB); Jtl Svenstavik, 1943, 2 specimens (LDN); Bräcke, 1936, 1 specimen (LTH);



Revsund, 1941, several specimens (BGW!); Ragunda (FRI, 8 specimens, VA!); Ång Hoting, 1936, 1 specimen (LTH); Vbt Vindeln, 1930, 2 specimens (LTH and Palm, 1934, p. 36!); Nbt Älvsbyn, 1930, 1 specimen (LTH and Palm, l.c.); Harads and Edeforsen, 1938, numerous (LTH); Över-Kalix, frequent; Över-Torneå, 1 specimen (LTH and Palm, l.c.).

*Norway:* Exclusively in the southeast, but then widely distributed and frequent. West along the coast as far as 5 Kristiansand; north as far as 15 Kongsberg; 2 Modum and Ringerike; 12 Gran; Biri; Ringsaker; Ilseng; 10 Roverud.

*Finland:* In the southern and central parts continuously distributed throughout as far as latitude 67° N, but north of latitude 64° N found only in the west. Northernmost localities: Ob Turtola (SBJ, MH!); Pello (LBG!); Rovaniemi (WEG); Lk Pelkosenniemi, 1937 (STN).

*Russian sector:* I. Kola Peninsula: Lt Kola, 1887 (PPP 1905, p. 91; MH!); 227 Lm Kantalaks, 1870 (SBJ 1873, p. 88; MH!); Lv Varsuga (EDG, MH!). Kk Kouta (SBJ, MÅ!). II. In southern Karelia two localities (PPP 1899a, p. 11), north as far as Kn Tiudie (MH!).

*Adjacent regions:* In Denmark (including Bornholm) widely distributed and frequent (West 1940, p. 18). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 336), also Ireland (JHS and HLB 1902, p. 581).

*Total area:* Palearctic species. In Europe south as far as Portugal and the Balearic Islands (FUE 1919, p. 76), central Italy (LUI 1929, p. 68), Greece (APF 1904, p. 111). In the northeast as far as Pechora (PPP 1907c, p. 308). Asia Minor (ECH 1922, p. 32). Syria (JEA 1941–1942, p. 475). The Caucasus (CHD 1846, p. 206). Kirgizia (HEY 1880–1881, p. 48). Western Siberia (HEY l.c.; SBJ 1880, p. 20; RM!).

### Ecology

On banks of stagnant or flowing, often very small bodies of fresh water, but also in humid meadows, moors, ditches, etc., where at least in summer there is no water visible. Mostly in open situations with tall vegetation of *Carex*, grasses, and similar plants, without prominent moss cover, but also among foliage and twigs in moderately shaded forest swamps. The principal requirement is that the soil consists of loam or contains a more or less distinct admixture of loam, and then found also on sand and gravel, as well as on peat, humus, etc. Rather local but often occurs in immense numbers. In Central Europe likewise on richly over-grown swampy ground.

### Biology

Southern Swedish catches: III: 8; IV: 30; V: 55; VI: 78; VII: 25; VIII: 18; IX: 28; X: 11; XI: 5; XII: 2. In Denmark maximum abundance already in April, and



the decline in midsummer as well as the increase in autumn are much more pronounced (LRS 1939, p. 325). Immature beetles numerous from July 14 (Dsl) to August 19 (Skå). In Denmark larvae in July and September (l.c.). Spring breeder, hibernating as an adult.

### Dynamics

Wing dimorphism evident. Wing rudiment of the brachypterous form devoid of an apical reflexed part and not even half the length of an elytron. Macropterous form fully winged and capable of flight. One specimen was induced to flight upon exposure to sun under glass (Gtl, May 24, 1940). Spontaneous flight  
228 observed near 12 Eidsvoll (July 8, 1933, LTH). The species has been found many times in sea drift in Finland (Frey 1937, pp. 420, 436; STÅ 1938, pp. 18, 20; PME 1944, p. 38).

### Variation

This species is extremely variable in size, shape, and coloration, and is sometimes difficult to distinguish from *unicolor*. In northern Sweden (especially in Nbt) and in Finland there is a form of *guttula* that is more slender in build, with a distinct bluish sheen and an indistinct preapical spot, and nearly always brachypterous (see LTH 1939–1940, p. 95). The morphological differences however are not so sharp as to justify the introduction of a new subspecies.

*\*Bembidion (Ocys) harpaloides* Serv.  
(*rufescens* Guér.)

### Distribution

(map in NET, E.B. 1916; BCH 1938, no. 18)

*Norway*: Only two localities in the extreme south: 5 Ormestad near Mandal on the bank of a rivulet, April 1906, 1 specimen (HLS 1910, p. 5); Agnefest in Lyngdal close to the seashore, 1 specimen (HMB in litt.).

Absent in the rest of Fennoscandia.

*Adjacent regions*: Absent in Denmark and the entire Baltic Sea region. British Isles (Joy 1932, p. 335), frequent in Ireland (JHS and HLB 1902, p. 580).

*Total area*: Euro-Mediterranean species. In Europe predominantly western, south as far as Portugal, southern Spain, and the Balearic Islands (FUE 1919, p. 77), Corsica (DEV 1935, p. 28), southern Italy, including Sardinia, Sicily (LUI 1929, p. 67), Western Balkans as far as Greece (OTZ 1886, p. 206). East as far as Polish Silesia (NET 1916; MÜL 1918, p. 68; questioned by HOR 1941, p. 163) and Austria (HOR l.c.); both regions appear isolated from the main area. Northern Africa (BED 1895–1914, p. 71). Madeira and Azores

(NET l.c.). Reports from Syria and western Siberia (JEA 1941–1942, p. 449) seem doubtful.

### Ecology

229 The essential conditions for life have yet to be clarified for this species. In the rest of Europe lives in “dark places,” especially under bark or at the base of *Populus*, *Salix*, and *Ulmus* (E.B. 1927, p. 160; DTZ 1937, p. 70; HOR 1937, p. 27; 1941, p. 163; MEY 1943, p. 288), also on river banks, but probably only occasionally, especially at the time of flooding (HOR 1937). Collected many times at the entrance to caves (RTT 1908, p. 123; MÜL 1926, p. 92). It is probable that this species, like the closely related *quinquestriatum*, is associated with animal nests (see below).

### Biology

Both Norwegian specimens were collected in spring. In England hibernating beetles have been collected (FWL 1887, p. 103; Joy 1932, p. 335) and immature beetles found, August 20, 1924, in a nest of *Garrulus* (Joy, E.M.M. 1925, p. 16). Hence it is probably a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed, as seen in specimens from France and Sweden. Insect certainly capable of flight, but corroborative observations absent.

*\*Bembidion (Plataphus) hasti* C.R. Sahlb.

### Distribution

*Sweden*: Exclusively in the high fjeld region of the north, as far as boundary between Jtl and Hjd. Actual gaps in distribution not apparent. Southernmost or lowest localities are: Hjd Nean, 1936, 1937, numerous (WRN!); Jtl Nean and Skarvdörriåset, 1937 (WRN!); Storlien, 1936, 1 specimen (KMN, ML!); Jorm, two localities, 1932 (JNS and Palm, E.T. 1936, p. 183!); Lyl Sorsele, Tjulträsket and Mattsojokkudden, 1921, 1928, several specimens (GTZ, E.T. 1932, p. 48!). Ammarnäs, Bissitschbäcken, June 27; 1932, 1 specimen (GTZ!); Lul Kvickjock, 1924, 1 specimen (ARW!); Tol Kebnekaise region, two localities, 1941, 2 specimens (BGW!); Abisko region, frequent (several collectors!), east as far as Kaisepakte (Holm! LTH); Karesuando, two localities (LBA! BRC, RM!).

Doubtful: “Vb” (= Vbt, possibly including Nbt) (WBG, coll. THS, ML!).

230 *Norway*: Distinctly a fjeld species, occurring only north of latitude 68° N, also at the coast (the record near 19 Ardal, MST, must be accidental). Because of the juxtaposition of the Swedish locality in Jtl the area extends along the

entire fjeld range, and it is only due to insufficient investigation of the Hardangervidda region that these two southern localities appear isolated: 21 Kvilldalsetren and Bleskestadmoen in Suldal, numerous (HLS 1915, pp. 16–17). Northernmost locality: 37 Hammerfest (MST).

*Finland:* Two separate areas. I. Fjeld region, of the north, south as far as Lk Muonio (RNK) and Lp Lutto region (PPP 1905, p. 90; MH!). Probably continuous with this are: Ob Rovaniemi (WEG!); Ks Paanajärvi (KRG!). II. Coast of the Gulf of Bothnia, five localities between Om Lohtaja (WUO, MH!) and Ob Uleåborg (WUO, MH!).

*Russian sector:* Numerous localities in the western part of Kola Peninsula (PPP 1905, p. 89), also near Lu Semostrov (MH!) and Lj Ponoj (MH!). In northern Karelia near Kc Kem (SBJ 1873, p. 77; MH! MÅ!).

*Adjacent regions:* Absent.

*Total area:* Palearctic species. In Europe, outside the region, only in Kanin (PPP 1909, p. 6) and in Pechora region (PPP 1907c, p. 308). Western Siberia (SBJ 1880, p. 16; Tolstoinos, RM!). Waigatsch Island (PPP 1910a, p. 311).

### Ecology

Exclusive riparian species, living only on quite open and barren, sandy, gravelly or stony banks (rarely with a thin loamy-mud layer). At lakes, rivers, brooks; in the extreme north and in Österbotten also at the sea (SBJ 1873, p. 77; LBÅ 1933, p. 118). It is highly hygrophilous and lives in the immediate proximity of water, usually together with *fellmanni*. It is predominantly a fjeld species, attaining maximum frequency in the *reg. bet.*, ascending up to about 900 m above sea level in the *reg. alp.* (Tol Abisko; BRD 1934, p. 223), and found only in the uppermost parts of the coniferous forest region (except for the Gulf of Bothnia). Kola Peninsula (PPP 1905, p. 89) and Siberia (PPP 1910a, p. 311) occurs in the tundra.

### Biology

Majority of the Swedish catches made in July, the rest in June and August. Immature beetles collected on July 29 (Tol) and August 4 (Pil). Hence the species hibernates, at least in part, as an adult.

### Dynamics

Wings fully developed. Spontaneous flight of numerous specimens observed on the bank of Torneträsk (Tol, July 1939) (LTH).

## Fossil Record

Skå Bara, late glacial (HNR 1933, p. 128).

*Bembidion (Hirmoplataphus) hirmocoelum* Chaud.  
(*parvicolle* J. Sahlb.)

## Distribution

*Russian sector:* Found in large numbers by KRV in June 1942 on the banks of a small river near Sv Vaaseni (!), and in 1943 found again by PFF there as well as near Mäkriänjärvi (about 30 km westward).

Absent in the rest of Fennoscandia and not known throughout the rest of Europe.

*Total area:* Palearctic species. The nearest record locality of the typical subspecies is Mt. Urengai in southern Ural (Jureček, 1 specimen, 1917, coll. NET!). Described from eastern Siberia, later found in Lena region (PPP 1906b, p. 30), on the Amur (BOD 1927b, p. 22), and near Vladivostok (Jureček, coll. NET!); also in western Siberia (HEY 1880–1881, p. 50; SBJ 1880, p. 17; RM!). Subspecies *friebe* NET (see below) found in Steiermark and Krain (NET 1921, p. 195; HOR 1941, p. 128).

## Ecology

KRV sent me a description (and a photograph) of the biotope near Vaaseni. The species lives here together with *punctulatum* on a totally barren, stony river bank right next to the water. PFF found it in the same region on a very similar bank together with *punctulatum*, *bipunctatum*, and *saxatile*. In Siberia found on sandy brook and river banks (SBJ 1880, p. 17; BOD 1927b, p. 22). Belongs in the forest region and has not been found to date in the tundra.

## Biology

Nothing is known about the period of development.

## Dynamics

Wings fully developed, and insect certainly capable of flight.

## Systematics

I confirmed the identity of the species with *parvicolle* J. Sahlb., as already established by NET, after examining a specimen labeled type (RM!). Very closely related to *friebe* NET from the eastern Alps. A study of the penis



revealed that the very complicated internal structure is completely identical in both *hirmocoelum* and *friebi*. However, the external features separating the two, as noted by NET (among others, 1942–1943, p. 108), appear to be constant. It is therefore appropriate to treat *friebi* as a subspecies of *hirmocoelum*. The subspecies *friebi* has been found on river banks, together with *prasinum* (MEY 1943, p. 278).

*\*Bembidion (Lopha) humerale* Sturm.

Distribution

(map in NET and MEY, K.R. 1932)

*Sweden*: Rare and extremely local. In the south, however, the species seems to inhabit a continuous area. Skå Malmö (leg.?, MW; NET and MEY, K.R. 1932); Stehag, 1887, numerous (several collectors!); Ven, 1934, 1 specimen (Palm 1935, p. 9); Hälsingborg (MCH, according to NET and MEY, l.c.); Herravadskloster (THS 1859, p. 206; Roth, E.T. 1897, p. 133; 6 specimens, MG! 1 specimen, (HM!); Vittsjö (THS 1867a, p. 21; 1 specimen, MB!), 1890 (VNS, 4 specimens, ML!). Ble Ronneby (ERC, according to NET and MEY, l.c.); Rödeby, July 20, 1941, 1 specimen (SDH!). Små Almedöda, June 17, 1924, 1 specimen (BRD!); Kalmar (AHT, VA! HGL, coll. JNS! WLN, LG!); Mönsterås (HGL, according to JNS). Hll Sperlingsholm, May 17, 1937, 1 specimen; (FGQ!); Stavsinge, June 2, 1935, 1 specimen (Palm). Vgl Göteborg, peat bog of Landala, June 1922, about 10 specimens; later searches proved futile (LTH). Gtl Gothen, June 15, 1942, 4 specimens (BGW!). Farther north, isolated from the rest of the area, two localities in Upl (GLL 1896, p. 12; according to one record, whose origin I no longer remember, near Gimo); Uppsala, 1 specimen (ARW!).

Doubtful: Öld (THS, 1 specimen, MB!). Vgl Hindås (OST, 1 specimen, MG!).

*Norway*: Absent.

*Finland*: In the south widely and apparently continuously distributed. Northernmost localities; St Rauma (SDM, MH!); Yläne (SBJ 1873, p. 86; MH! MÅ!); Sa Kristina (SUH); Ki Parikkala (SBJ, MH!); Salmis, two localities 233 (N.E. 1938, pp. 129, 132). Also on three islands in the Skärgård between Åbo and Åland (WEG; LBG; Sundberg, coll. WLL). These two localities isolated: Tb Saarijärvi, Pyhähäkki, 1943 (KRG); Om Pedersöre, Vestersundby, June 9, 1929, 1 specimen (STÅ).

*Russian sector*: Only in southernmost Karelia (Sv), three localities (among others, PME, S.H.A. 1943, p. 35!), north as far as Vaaseni (KRV!).

*Adjacent regions*: In Denmark rare, occurring in Jylland and two localities on northeastern Sjaælland; on Bornholm probably found accidentally (West 1940, p. 16). In Estonia only two localities, one (probably accidental) on the

small island Aksi on the northern coast (HAB in litt.). Latvia (Kurland; LCK and MIK 1939). Leningrad region (SBJ 1873; OBT 1876; BSK 1908a, p. xl).

*Total area:* Solely European species. South as far as central France (DEV 1935, p. 27), the Pyrenees<sup>14a</sup> (FUE 1919, p. 74), central Italy<sup>14b</sup> (LUI 1929, p. 66), Croatia (APF 1904, p. 109), Transylvania (PTI 1912, p. 17). East as far as Poland (LMN 1913, p. 55; ROU 1930, p. 127; NET and MEY 1932) and northern Rumania (NET and MEY, l.c.). In Russia apparently occurs only in Karelia and Leningrad region.

### Ecology

In Sweden exclusively in peat bogs, on barren, rather humid, black patches of peat mould, often at the edge of ponds and ditches. In Central Europe this mode of life is likewise normal (for instance, SDT 1870, p. 406; West 1940, p. 17; B.E.Z. 1872, p. 156; NET and VOG 1916, p. 68; E.B. 1927, p. 159; 1936, p. 38; W.E.Z. 1927, p. 4; ROU 1934, p. 79; GRD 1937, p. 42; HOR 1937, p. 23; 1941, p. 158); the species has also been mentioned for completely dry peat soil. The occurrence in the Munich region on loamy soil in a brickwork (E.B. 1934, p. 104) is interesting. However it should have been ascertained whether the species occurs there constantly, and whether HOR (1937, p. 23) it is indeed correct in considering *humerale* a tyrphobiont, rather than a tyrphophilous species, as done by Peus (1928, pp. 577, 668). Regardless, I consider its repeated occurrence, often in large numbers, on the seashores in Finland (PME and PFF 1943, p. 139) an accidental manifestation of swarming (see *gilvipes*).

234

### Biology

The very few Swedish catches are distributed as follows: V: 6; VI: 8; VII: 2; VIII: 0; IX: 1. In Denmark, with extensive material, maximum abundance in June more pronounced, as is the decline in July (LRS 1939, p. 324). In Central Europe immature beetles have been recorded at the beginning of August (BUR 1939, p. 81). As assumed by LRS (l.c., p. 381), definitely a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Indications of flight capacity are, among others, its frequent occurrence on seashores (see above) and in sea drift (PME 1944, p. 37) in Finland.

<sup>14a-b</sup>Records from the Pyrenees and Italy have not been included by NET and MEY (l.c.).

\**Bembidion (Plataphus) hyperboreaorum* Munst.  
(N.E.T. 1923, p. 235)

Distribution

*Sweden*: Exclusively in the high fjelds. Definite records: Jtl Jorm, two localities, June, July 1, 1932, numerous (JNS and Palm, E.T. 1936, p. 184!). Lyl Sorsele, Tjulträsket, 1928, 2 specimens (GTZ, E.T. 1932, p. 49!). Ammarnäs, June 22, 1932, 1 specimen (GTZ!). Lul Sarek, Sitojaure, August 21, 1939, 1 specimen (LTH). Tol Abisko, bank of Torneträsk, locally frequent (several collectors! See BRD 1934, p. 222), easternmost near Kaisepakte, July 21, 1939, 3 specimens (LTH).

Doubtful: In older collections this species is labeled *virens* ("pfeiffi"), for example in coll. ZTT (ML!) from his trip in 1832 to southern Lapland, and 1840 to Jtl and adjacent parts of Norway. There is also one specimen labeled "Lapp. bor." (probably = Lul; BOH, RM!). Unfortunately the exact locality has not been given for any of these specimens.

*Norway*: Only in the extreme north, but found in many localities both in the inland and at the coast. Southernmost localities situated in Målselv region (N.E.T. 1926, p. 159; 1932, p. 25; STA in litt.); northernmost, four localities at the Porsanger Fjord (N.E.T. 1923, p. 238). Not found to date in southern Varanger. Oddly, all the Swedish localities are situated south of those in Norway.

*Finland*: In the fjeld regions of the high north, south as far as Li Lemmenjoki, 1917, 1 specimen (THG!); Lk Muonio (MKL, MH!). Father south, two  
235 isolated localities: Ks Salla, Korvasvaara, along a cold-water brook (KRG!); Ok Sotkamo, 1936, 1 specimen (PHJ!).

*Russian sector*: Reported to date only from Lj Ponoj (PPP 1905, p. 90, "*prasinum*"; MH!).

*Adjacent regions*: Absent.

*Total area*: Palearctic species. In the rest of Europe known only from Kanin (LTH 1943a, p. 11). Siberia, Yenisey, and Lena region (LTH l.c.).

Ecology

The mode of life of this species is completely identical with those of *hasti*, with which it is often found together (N.E.T. 1923, p. 235; Tol Abisko); hence it occurs on stony, gravelly, or coarse-grained sandy, completely barren banks of lakes, rivers, and brooks (but not found to date at the sea). Its occurrence on a loamy bank in Lp (LBÅ 1933, p. 115) was certainly just accidental. In Sweden chiefly in the *reg. bet.*, in Jtl and Lyl also in the uppermost part of the coniferous forest region. In Norway (STA in litt.), as well as the Kola Peninsula and Kanin Peninsula, and in Siberia (LTH 1943a, p. 11) found in the *reg. alp.* and the tundra respectively.

## Biology

Swedish catches made in June to August, most in July. One immature beetle was collected in July (Tol). Possibly hibernates, at least in part, as an adult.

## Dynamics

Wings fully developed. Spontaneous flight of numerous beetles observed in July 1939 (Tol Abisko, LTH).

*\*Bembidion (Nepha) illigeri* NET  
(*quadriguttatum* auct., nec Ol.; *genei* Küst p.p.)

Distribution  
(map in NET and MEY, E.B. 1937)

*Sweden*: Partly in the south, chiefly on the coast, and partly in a broad belt across central Sweden. I. In Skå and on GtI particularly widespread. Northernmost localities on the southern coast: Boh Sämstad, July 3, 1944, 1 specimen (LTH); Små Kalmar (WLN, LG!); GtI Lickershamn, 1934 (LOH!). II. 236 In central Sweden the southernmost localities are: Vgl Hindås (OST, MG!); Falköping, 1936 (LTH); Hjo, 1938 (KLF); Små Gränna, 1928 (Palm, coll. LTH); Ögl Omberg region, rather frequent (Palm!); Linköping, 1918 (SLL, VA!), 1921 (GTZ!); Norrköping, 1926, 1 specimen (WSJ!); Sdm Trosa (SJB). Northern boundary represented by the following localities: Vgl Lidköping (GYL 1810, p. 21); Kinnekulle, 1938, 1 specimen (SDH!); Gullspång, 1936, 1 specimen (LTH); Nke Tysslinge (according to Lindgren); Örebro (JNS! WSL!); Upl Ålandsdal, 1925 (Holm!); Uppsala region (several collectors!); Vaddö, Elmsta, June 23, 1936, frequent (LTH).

*Norway*: No records to date.

*Finland*: Discovered on Åland only in recent years: Eckerö, Torp, 1943 (LBA); Hammarland, 1936 (GBL, N.E. 1936, p. 122), Marsund, 1936 (MER, S.H.A. 1937, p. 105; MÅ!); Geta, 1939 (WLL); Finström, Bjärström, 1943 (LBÅ). One specimen collected in 1939 near NI Tvärminne in sea drift in the Skärgård (PME, S.H.A. 1940, p. 81!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark rather frequent and widely distributed, also on Bornholm (West 1940, p. 17). In Estonia only one locality at Lake Pejpus (HAB in litt.); in Latvia (Kurland) more widely distributed (SDL 1872, 1891, "*quadriguttatum*"); LCK and MIK 1939). Leningrad region (OBT 1876, "*quadriguttatum*"). British Isles, also Ireland (NET and MEY, E.B. 1937).

*Total area*: Solely European species. South as far as central France (DEV 1935, p. 27), central Italy (LUI 1929, p. 64; NET and MEY, l.c.), Greece (MEY, E.B. 1938, p. 95). East as far as Poland (MAZ, P.P.E. 1922, p. 5; OGI 1931,



p. 23), Slovakia (ROU 1930, p. 124), northern Rumania (NET and MEY, l.c.). *B. genei* Küst., often considered the "principal variety" ("Hauptart") of *illigeri*, is Mediterranean in distribution (NET and MEY, l.c.).

### Ecology

Exclusively on open, barren (or very sparsely overgrown), humid loam, usually in the vicinity of ponds, puddles, or ditches, especially in loam pits. Sometimes on loam-mixed sand or peat. Predominantly in places where the upper loamy layer is rather dry, so that the insects can hide in cracks. Also on loamy banks of lakes, smaller rivers, or at the sea. Regularly found together with *articulatum*, and locally with *nitidulum*. The dependence of this species on loam has been  
237 emphasized in observations from Denmark also (SDT 1841, p. 349; West 1940, p. 17) and the rest of Europe (for instance, E.M.D. 1916, p. 158; Dahl 1928, p. 65; GRD 1937, p. 42; HOR 1937, p. 22).

### Biology

Swedish catches: III: 1; IV: 2; V: 28; VI: 38; VII: 20; VIII: 6; IX: 4. In Denmark occurs almost uniformly throughout the summer (LRS 1939, p. 324). Immature beetles found on August 7, 1929 (Ble). In Denmark larvae from June to August (l.c.). Spring breeder, hibernating as an adult. In Skå the species reportedly causes serious damage to small rape plants (LBL and TGR 1923, p. 15). It might, however, be predominantly carnivorous.

### Dynamics

Wings fully developed. Spontaneous flight, and flight induced upon exposure to sun under glass, observed in May 1940 in Gtl (LTH).

*\*Bembidion (Metallina) lampros* Hbst.  
(*celere* Fbr.)

### Distribution

*Sweden*: A very frequent species, distributed throughout the country except in the fjelds; however becomes somewhat more scarce toward the north. Highest localities: Dlr Fulufjäll (TJB); Hls Los (SJB!); Ramsjö, 1943 (LDN!); Jtl Hackås, 1942 (BGW); Åre, 1840 (ZTT, ML!); 1941 (BGW!); Ånn, 1934 (LTH); Ulriksfors, 1936 (LTH); Ång Tåsjö, 1939 (BRC, RM!); Åsl Vilhelmina, 1936 (LTH); Lyl Storuman, 1936 (LTH); Sorsele, as far as Ammarnäs, 1932 (see GTZ, E.T. 1932, p. 49!); Pil Arvidsjaur, 1936 (RGS!); Lul Porjus, August 24, 1939, frequent (LTH); Gällivare, May 14, 1933 (HJD!); Nbt Korpilombolo, July 27, 1938, 1 specimen (LTH).

*Norway:* Frequent throughout southern Norway as far as Trondheim region, and absent only in the true fjelds. No gaps in distribution. Northernmost localities: 28 Steinkjer (N.E.T. 1937, p. 145); 30 Hattfjelldal (STE, according to SPS 1902, p. 11; 7 specimens, MO!).

Erroneous: 37 Hammerfest (STR, according to SPS 1899, p. 147). Identification (1 specimen MT; STA in litt.) correct. Hence some confusion of localities, especially since five specimens, purportedly of this species, were found high on the fjeld (l.c.).

*Finland:* Universally distributed in the southern and central parts, and apparently continuous to north of the Polar Circle. Northernmost localities: Ob Pello (KNG!); Lk Muonio (SBJ 1873, p. 81); Pallastunturi (KNG); Kittilä (KRG); Ks Salla (KRV!); Paanajärvi (several collectors).

*Russian sector:* Found only in southern Karelia, but in many localities (several collectors!), north as far as Kn Semsjärvi (CRP!).

*Adjacent regions:* In Denmark all over and very frequent (West 1940, p. 12). Estonia, including Ösel and Dagö (HAB in litt.); Latvia (SDL 1872, and others). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 340), also Ireland (JHS and HLB 1902, p. 583).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 60), southern Italy, including Sardinia (LUI 1929, p. 59), Greece, including Crete (APF 1904, p. 83). Northeast as far as Pechora (SBJ 1898, p. 338). Asia Minor (ECH 1922, p. 31; BOD 1927a, p. 57). The Caucasus (CHD 1846, p. 204; SDR and LDR 1878, p. 85). Western Turkestan (HEY 1880–1881, p. 49). Siberia (among others, SBJ 1880, p. 19; in RM however only *properans* present; in MH, contrarily, the species is represented from the Yenisey region!), east as far as Lena (PPP 1906b, p. 27). Northern Mongolia (PPP 1907d, p. 6). In North America (among others, HOR 1941, p. 119) doubtful; Leng (1920, p. 52) cites "*lampros* auct. nec Hbst." as a synonym for *musculicola* Hayw.

### Ecology

This species is the most frequent and the most eurytopic of all our species of *Bembidion*. It is in no way a riparian species, although it also occurs near water on firmer, moderately humid soil. Moreover it is at home in open, sun exposed places of all kinds, where the vegetation is neither too high nor too dense. Cultivated soil underscores its appropriate biotope; maximum abundance in fields, and hence strongly favored by culture, especially in wooded regions. Found on loam, sand, gravel, peat, etc., and hence soil conditions inconsequential; often found in places with completely dry surface layer. In addition to *quadrinaculatum*, often a successive species, it is the most resistant to desiccation among the species of *Bembidion*. Ecological ubiquity also evident in Central Europe (among others, West 1940, p. 12; GRD 1937, p. 40). According to Dahl (1928,

p. 59) the species apparently changes its habitat by retreating from open fields during winter. This feature, manifest in most riparian species, has not been observed by me in *lampros*.

### Biology

Southern Swedish catches: I: 1; II: 2; III: 6; IV: 34; V: 120; VI: 211; VII: 69; VIII: 47; IX: 38; X: 9; XI: 6; XII: 2. In Denmark also maximum abundance in June (LRS 1939, p. 321). Very numerous immature beetles found from June 27 (Upl) to September 15 (Gtl), and even in the north as early as July 10 (Vbt). In spite of the early appearance of the adult in spring, it is nevertheless likely that larval development always takes place in summer. In Denmark larvae have been observed from the end of June to September (l.c.). Hibernates as an adult. Although normally definitely carnivorous (BLK 1925, p. 19), the species sometimes attacks young seedlings, e.g., in forest beds (D.E.Z. 1879, p. 417), of *Matthiola* (Sdm; LBL 1928, p. 10) and other crucifers (Norway, Denmark; NOT 1943, p. 37), as well as seedlings of *Pisum* (Vgl; LBL 1927, p. 13).

### Dynamics

Wing dimorphism evident and both forms frequently occur in our region. Wings of brachypterous specimens lack a reflexed apical part and attain only two-thirds the length of an elytron. Macropterous form capable of flight: one specimen found on a very wet quaking land†, apparently a strayed individual, (Upl Djursholm, June 23, 1942) was induced to flight upon exposure to sun under glass. The regular occurrence of this species in sea drift in Finland (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37) is also corroborative of flight, as is the record of 25 macropterous beetles on the seashore near Öld Byerum, June 5, 1943 (BRK!).

### Systematics

For a discussion of the independent status of *lampros* and *properans*, see LTH 1939–1940 (p. 71). JEA (1941–1942, p. 535) has illustrated and described the penis of *properans* and *lampros* and claims specific identity.

### Fossil Record

England, postglacial (Bell 1922, p. 46).

† (= "Bebeland"; cf. page 49; suppl. scient. edit.).



\**Bembidion (Chrysobracteum) lapponicum* Zett.  
(*jenisseense* J. Sahlb.; see LTH 1939–1940, p. 63)

#### Distribution

*Sweden*: Only in the fjeld regions. One locality in Jtl: Handöl, on the lower course of the river, June 15, 1934, 3 specimens (LTH). Additionally only in Tol: Abisko, bank of Torneträsk, June 30, 1937, 4 specimens (RNG, ML!), July 1939, in large numbers (KRG, LTH), July 1942, likewise numerous (LDN), in the delta of Vadvejokk, July 17, 1939, 4 specimens (LTH; strangely, not found in the Abisko region by earlier collectors, e.g., SLL, BRD); Vittangi, numerous (ZTT 1828, p. 6; 1840, p. 24; unlabeled specimen, ML!); Karesuando, three localities at the river, 1930, 1935, numerous (BRC, RM!).

Doubtful: In coll. ZTT (ML!), 1 specimen which, according to the label was collected in 1832 in southern Lapland (see LTH 1938, p. 13).

*Norway*: I. Two localities south of Trondheim Fjord: 27 Melhus and Storen (LYS, N.E.T. 1937 p. 145!). II. In the north, from 31 Vefsn and Mosjøen (LYS, STA) and 32 Mo (STA) right into 38 Porsanger region, four localities (several collectors!), also at the coast. In southern Varanger not recorded to date. The distribution is uneven but probably, at least originally, continuous.

Doubtful: 39 Karasjok (SPS 1910a, p. 70; I have seen only *velox* there).

*Finland*: Only in the extreme north, four localities: Le Enontekis, Palojoensuu, July 8, 1924, 1 specimen (LBÅ 1927, p. 16!); Li Tanajoki (KRG); Lp Yläluostari, frequent (many collectors!); Parkkino, 1 specimen (KRV!).

*Russian sector*: Only near Lt Nuortijärvi, July 1, 1899, 1 specimen (PPP 1901, p. 74; 1905, p. 88; MH!).

*Adjacent regions*: Absent.

*Total area*: Palearctic species. In the rest of Europe known only from northern Russia, Pechora (SBJ 1898, p. 338; PPP 1907c, p. 307). In Siberia more widely distributed (SBJ 1880, p. 14; RM! PPP 1907d, p. 5), east as far as Lena (PPP 1906b, p. 27); subspecies *latiusculum* Motsch. east as far as Kamchatka (BNN, NET, SBR 1929, p. 3; LTH l.c.).

#### Ecology

Stenotopic for barren sandy or finely graveled, sometimes quite stony banks of lakes and rivers (among others, SPS 1888–1889, p. 101; N.E.T. 1932, p. 25). The report for loamy places in Lp (LBÅ 1933, p. 115) certainly an accidental find even though some admixture of loam may be tolerated (STA in litt.).

241 Lives on drier soil than *velox* and hence farther away from water. Highly heliophilous but less volant than *velox*; in overcast weather often hides under strips of organic debris washed ashore. Within the region, found in the *reg. bet.* and in the upper parts of the coniferous forest region. Reported from Pechora for the tundra (PPP 1910a, p. 309, "*jenisseense*").



## Biology

In Scandinavia, as far as I know, found only in June and July (see also SPS 1888–1889, p. 101; 1910a, p. 70; N.E.T. 1932, p. 25). Nothing known about its cycle of development; one can only assume that, as in the other species of *Chrysobracteon*, hibernation takes place mainly in the adult stage.

## Dynamics

Wings almost as well developed as in *velox* (LTH 1939–1940, p. 64), and flight capacity not perceptibly less. In any case, in sunny weather it always attempts (like *velox*) to flee, using its wings.

\**Bembidion* (*Chrysobracteon*) *litorale* Ol.  
(*paludosum* Panz.)

## Distribution

*Sweden*: A strangely split area. I. Isolated area on the southern Swedish highland: Små (THS 1859, p. 198; BOH, 9 specimens, RM!), Ryssby, Tutaryd, June 1, 1923, 9 specimens (GTZ!); Färgaryd, Nissaryd, June 26, 1936, 1 specimen (SDH!); Skillingaryd, June 1936, 18 specimens (LTH), July 1939 (JNS); Eksjö (SDN, E.T. 1900, p. 138; 5 specimens, MG!); Vgl Hagen near Åtran, July 1905, numerous (VNS, E.T. 1903, p. 255; several collections!). II. In Vrm along Klarälven between Karlstad and Slättne widely distributed and locally frequent (Palm and LTH 1937, p. 117!). Also near Lundsberg, June 1936, several specimens (WRN!). III. In Ång, two localities: Mo, Moliden, June 1939, 2 specimens (BRC, RM!); Örsbäcken, 1936, 1 specimen (ERL!).

Doubtful: Skå Ringsjön (VNS, 1 specimen, coll. JNS! Definitely a wrongly labeled specimen from Vgl; also 1 specimen "Skå, VNS," RM!). Vst (ANK, 1 specimen, VA!). "Lappl." (coll. THS, 5 specimens, MB! 2 specimens ML! See *argenteolum*).

242 *Norway*: I. At the large rivers of the southeast: 2 Ringerike (WRL); 10, four localities at the Glommen between Kongsvinger (SHY 1879, p. 14) and Åmot (MST). II. In the Trondheim region: 27 Stören; Melhus, Orkedal; 28 Hell in Stjördal (N.E.T. 1923, p. 276; 1937, p. 145); Nes in Verdal, July 1840 (ZTT, ML!).

Erroneous: 38 Alta, Bossekop (CHP, E.M.M. 1890, p. 72; probably = *lapponicum*; MST, N.E.T. 1921, p. 91).

*Finland*: I. In the southeast area continuous; especially numerous in the Isthmus of Karelia. Delimiting localities west and north: Ta Padasjoki (EHN, MÅ!); Juupajoki (KNG, N.E. 1934, p. 126!); Tb Jyväskylä (KRG!); Sb Kuopio (WLL!); Korkeakoski (SAA!); Kb Koli (STN!). II. Ks Kuusamo (LBG! KNG). Paanäjärvä (numerous collectors!). III. Completely isolated: Le Peltotunturi,

at the upper course of the Käkälönjoki near Kalmakaltio (*reg. bet.*), July 16, 1905, 1 melanistic specimen (SAA!).

*Russian sector:* Only in the Swir region, five localities (PPP 1899a, p. 9; MÅ! Several collectors!).

*Adjacent regions:* In Denmark only in southern Jylland, six localities within a sharply limited region (West 1940, p. 12). In Estonia rather widely distributed (SUM 1931; Palm 1943; HAB in litt.), also on Ösel (HAB 1936a). Latvia (ULN 1884; ISH 1927; LBÅ 1932). Leningrad region (OBT 1876; JAC 1908). British Isles (Joy 1932, p. 334). Shetland (West 1930, p. 74).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 59), northern Italy (LUI 1929, p. 58), Greece (OTZ 1886, p. 205). In the northeast as far as Arkhangel'sk (PPP 1907c, p. 307) and Pechora (SBJ 1898, p. 338). Kirgizia (HEY 1880–1881, p. 52). Siberia (among others, SBJ 1880, p. 12; RM!), east as far as Lena (PPP 1906b, p. 27). Trans-Baikal and Ussuri (MDL 1931, p. 4). The records from North America (Leng 1920, p. 49; JEA 1941–1942, p. 546) are erroneous according to NET (1940, p. 160).

### Ecology

Throughout Fennoscandia a stenotopic riparian species, but also found along small bodies of water. It occurs farther away from water and higher up than *velox* and *argenteolum*, where there is some vegetation, albeit sparse, consisting of *Carex*, *Agrostis*, *Ranunculus reptans*, *Equisetum*, and similar plants, and only at places where the fine-grained sand (often loam-mixed) has a thin surface layer of humus and mud. Tolerates weak shade of overhanging *Salix* bushes.

- 243 Detailed descriptions of the biotopes, as well as photographs, have been given by Frey (N.E. 1933, p. 81) and PME and PFF (1943, pp. 105 ff.). Regularly successive species, *semipunctatum*. In Central Europe the dependence of this species (*litorale*) on running water is not so pronounced since it has also been found (albeit seldomly) on lakesides and in loam pits (GRD 1937, p. 40). On the other hand, HOR (E.B. 1935, p. 220) reports that such localities occurred in two cases in old river beds; these were probably relicts.

### Biology

Almost all Scandinavian catches have been made in June, and only a few in July. In Denmark numerous specimens were also caught in May, while immature beetles have been found there at the end of July (LRS 1939, p. 321). As assumed by LRS (l.c., p. 375), probably a spring breeder, hibernating as an adult. In Germany observed feeding on a Collembola (GRD 1937, p. 28).

## Dynamics

Wings fully developed. This insect does not fly as often nor so actively as the other species of *Chrysobraceon*, although it flies regularly during intense sunshine. Opposite observations from Karelia (KRG, N.E. 1923, p. 121; PME and PFF 1943, p. 132) are peculiar; KNG (in litt.) has observed the beetle flying in that region, and there are numerous records from Sweden (LTH) as well as other parts of Europe (for instance, FWL 1887, p. 121; Dahl 1928, p. 55; GRD 1937, p. 68; HOR in litt.).

\**Bembidion (Peryphus) lunatum* Dft.

## Distribution

*Sweden*: Markedly western species. The records in Skå and on Old may be more or less accidental. Ska ("O. Möller," coll. RGS! Leg. ?, 2 specimens, MG!), Ystad region, bank of Kabusa-ån River, June 24, 1931, 1 specimen (Palm!); Lomma, in loam pit at the sea, June 22, 1941, 2 specimens, July 4-8, 1942, several specimens (Palm!). Öld (certainly Stora-Rör area; ERC, 1 specimen, MG!). Vgl Göteborg, numerous specimens collected by older entomologists from humid loam at several places along the Göta-ålv, the last in June 1907 by SDN near "Slakthuset" in large numbers (several collectors, 244 several collections!); Kinnekulle, Hönsäter, July 5, 1872, several specimens (MRT 1873, p. 9). Vrm (MLB, according to GYL 1827, p. 405), four localities on the Klarälven, June 1933, but only singly (Palm and LTH 1937, p. 117!).

Doubtful: Boh (GLL 1896, p. 11; "Bohusläns skärgård," coll. THS, ML! Probably relates to records near Göteborg). Vst (FHR, 1 specimen, VA!). Jtl (BOH, according to THS 1859, p. 203; 1 specimen, RM! It is indeed possible that this specimen actually originates from Norway, which was visited by BOH during the same trip. Compare with *minimum*).

*Norway*: Within a fairly broad belt from the Swedish border right into the Trondheim region. Delimiting localities: 1 Sarpsborg (SIE 1875, p. 87); 2 Oslo (l.c.); Modum (l.c.); 23 Røysheim in Böverdalen (MST); 20 Åk and Andalsnes in Romsdal (MST); 11 Tynset (SJB). At the Trondheim Fjord, four localities (N.E.T. 1937, p. 145), also Trondheim, July 9, 1933 (LBÅ!). Finally four localities farther north: 31 Elsfjorden (STA); 32 Ramnå (STA: NTV, MO!); two localities in Saltdal (SPS 1888-1889, p. 103; several collectors).

Absent in eastern Fennoscandia.

*Adjacent regions*: Denmark, only in Jylland, not frequent but rather widely distributed, north as far as Randers (West 1940, p. 14). Doubtful in Estonia ("Livland," SDL 1891). In Latvia, near Dūna (MIK 1905). Not found in Leningrad region. British Isles (Joy 1932, p. 340), also Ireland (JHS and HLB 1902, p. 584).



*Total area:* Palearctic species. In Europe south as far as southeastern France (DEV 1935, p. 26), northern Italy (LUI 1929, p. 62), Croatia (APF 1904, p. 93), Transylvania (PTI 1912, p. 16). East as far as Ural (JAC 1905–1908, p. 285); in the northeast as far as Kolwa in northern Russia (PPP 1907c, p. 308). Siberia (MÜL 1918, p. 90). Mongolia (JEA 1941–1942, p. 508).

### Ecology

An exclusive riparian species, which always lives on loamy soil or on loam-mixed fine-grained sand. On firm humid soil with tall vegetation (for instance, *Arctium*) or in the shade of willows or other bushes. With us occurs on the seashore only in Skå and central Norway; in the rest of Scandinavia stenotopic on the banks of larger rivers (its occurrence on the banks of Vänern near Kinnekulle is certainly secondary). In the rest of Europe, likewise partly at the sea (SDT 1870, p. 412; West 1940, p. 14; E.M.M. 1913, p. 187; 1915, p. 228; SRN 1926, p. 15; GRD 1937, p. 40; JEA 1941–1942, p. 508), partly on river  
245 banks (FWL 1887, p. 115; NET and VOG 1916, p. 66; HOR 1941, p. 137; MEY 1943, p. 281; JEA l.c.). Its dependence on loam has been mentioned frequently as well as its occurrence (also in the inland regions) at saline places (Dahl l.c.). Still the species cannot be considered halophilous.

### Biology

The very few dated catches from Scandinavia can be divided as follows: VI: 10; VII: 6; VIII: 0; IX: 1. In Denmark, with extensive material, the species appears first at the end of May (1 specimen), and becomes most frequent in July and August (LRS 1939, p. 323); in Germany already found in April (Rapp 1933, p. 42). Two immature beetles (Vrm) found respectively on June 18 and June 19, 1933. LRS (l.c., p. 378) is certainly right in concluding that this species breeds in autumn and hibernates in the larval stage.

### Dynamics

Wings fully developed. Spontaneous flight observed near 13 Vinstra in Gudbrandsdalen, July 5, 1933 (LTH) and in northern Germany (GRD 1937, p. 64).

*\*Bembidion (Philochthus) lunulatum* Fourc.

### Distribution

*Sweden:* Only in southern Skå and from one locality on Öld. Skå (VNS, 1 specimen, MG!). Tomelilla, June 4, 1925, 2 specimens (ARW!); Ystad, May 8, 1911 (AMM, ML!); Kungstorp, August 7, 1936, 2 specimens (Palm!); Lomma, May 6, 1938 (HZE!), July 1, 1943, 3 specimens (Palm); Ven, 1934, 2 specimens



(Palm 1935, p. 9!); Klinta near Ringsjön, 1922 (LTH). Old Halltorp, 1921 (LTH), September 1939 (BRC, RM!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rare but found in southwestern Jylland and on the islands, including Bornholm (West 1940, p. 18, and in litt.). Latvia, one locality (BRM 1930). Not known from Estonia and Leningrad region. British Isles (Joy 1932, p. 336).

*Total area:* Euro-Mediterranean species. In Europe occurs south as far as southern Spain and the Balearic Islands (FUE 1919, p. 77), Corsica (DEV 1935, p. 28), southern Italy, Sardinia, Sicily (LUI 1929, p. 68), Greece (APF 1904, p. 112). East as far as Volga (JAC 1905–1908, p. 291), southern Poland (MAZ 1922, p. 5; TEN 1931, p. 330), Slovakia (ROU 1930, p. 129), Transylvania (PTI 1912, p. 18). Northern Africa (BED 1895–1914, p. 70).

## Ecology

Always on humid loamy soil with rich vegetation, in the vicinity of lakes and ponds or at the sea. Its dependence on loam has also been confirmed from Central Europe, where it has often been found in loam pits, for instance in brickworks (E.M. 1914, p. 118; K.R. 1926, p. 207; E.B. 1936, p. 270; HOR 1937, p. 26; 1941, p. 165), also at the sea (E.M. l.c.; FCS 1901, p. 170; GRD 1937, p. 78); in Bohemia purportedly in peat bogs (ROU 1934, p. 76).

## Biology

In Sweden found from May to September. In Denmark found already in March, with maximum abundance in May (LRS 1939, p. 325). An immature beetle was found on August 7, 1936 (Skå). LRS (l.c., p. 383) believes that the species breeds in spring and hibernates as an adult, which might also be true in our region. Peculiarly however, in northern Italy immature beetles have been observed as early as May (MÜL 1926, p. 93).

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*\*Bembidion (Emphanes) minimum* Fbr.  
(*pusillum* Gyll.)

## Distribution

*Sweden:* A pronounced coastal species, distributed along the entire west coast, from Skå Trälleborg (MLF, MG!) as far as Boh Sämstad, July 1944, nu-

merous (LTH). The localities in the east seem to lack a connection with that region: Blc Karlskrona, May 1944, 4 specimens (SDH!); Torhamn, October 1943, 1 specimen (SDH!). Små (BOH, RM!), Kalmar (WLN, LG!). Öld, five localities (several collectors!). Gtl, five localities, north as far as Lärbro, Vägome, June 10, 1942, 1 specimen (BGW!). The record of a solitary specimen near Sdm Husby-Oppunda in the inland, 1943 (OLS!) is certainly accidental.

Erroneous: Dlr (GLL 1896, p. 13; probably according to a communication from AND in whose collection, however, only *lampros* is present under this name, LF!). Jtl (BOH, 1 specimen, RM! Possibly a wrongly labeled specimen from Norway, where BOH collected this species near Tynes; see ZTT 1840, p. 25). The localities mentioned by ZTT (l.c.) from northern Sweden are likewise erroneous (see LTH 1938, p. 13).

247 *Norway*: Exclusively at the sea. I. Southeast, on both sides of Oslo Fjord, several localities north as far as Oslo. Then near Søgne in the extreme south. II. Totally isolated, two localities in Trondheim region: 27 Vallersund (N.E.T. 1937, p. 145); 28 Tynes in Verdal (BOH, according to SIE 1875, p. 88; ZTT, July 1840, 1 specimen, ML!). Its absence throughout the entire western country can hardly be ascribed to insufficient investigation alone.

*Finland*: Exclusively at the sea; distribution lacks continuity. Ik Terijoki (HLL); Vammeljoki (KRG!). Nl Pärnä, May 1943, 1 specimen (LBG); Munksnäs near Helsinki, December 6, 1938, 1 specimen (SUH!). Al Jomala (PFF), Ramsholmen, June 15, June 24, 1922, frequent (LBÅ 1924a, p. 31!), Ytternäs (STK); Sottunga, July 6, 1933 (LBG!); Kökar (STN! LBG). Ab Åbo region (SBJ 1873, p. 83; several collectors!); Nystad (SDM, MH!). Oa Replot, 1940 (LBÅ). The old record from Vasa (WAS, according to SBJ, l.c.) is therefore possibly correct.

*Russian sector*: Absent.

*Adjacent regions*: In Denmark widely distributed (also on Bornholm) and not rare (West 1940, p. 16). In Estonia numerous localities on the northern and western coasts (HAB in litt.), including Ösel (HAB 1936a) and Dagö (LBÅ 1924b). On the other hand, not known to date from Latvia (LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 341), also Ireland (JHS and HLB 1902, p. 582).

*Total area*: Palearctic species. In Europe predominantly on the coast, south as far as Portugal, southern Spain and the Balearic Islands (FUE 1919, p. 71), southern Italy, Sardinia, Sicily (LUI 1929, p. 66), Greece (OTZ 1886, p. 205). East in southern Russia as far as the Don (NET 1935, p. 26) and As-trachan' (JAC 1905–1908, p. 288). Northern Africa (BED 1895–1914, p. 68). Asia Minor (ECH 1922, p. 32). The Caucasus (JAC l.c.). Kirgizia and western Siberia (HEY 1880–1881, p. 49; JAC l.c.).

## Ecology

In our region almost exclusively a coastal species. The only true inland record (Sdm, 1 specimen) was certainly accidental, but on Öld the species was collected near Resmo (June 10, 1943, 2 specimens, BRK!) at a pond with absolutely sweet water, about 3 km from the sea. Always on rather humid loam or highly loam-mixed sand, with more or less rich vegetation, for instance marshy meadows or places where *Atriplex* and other halophytes grow in patches; found very often among seaweed as well. Frequent successive species: *Dyschirius salinus* (among others, LBÅ 1924a, p. 31). In Central Europe like-  
 248 wise predominantly an insect of the seashore. But there are numerous records from the inland as well, the majority of which have been made at saline places however (S.E.Z. 1844, p. 202; B.E.Z. 1861, p. 186; NET and VOG 1916, p. 67; E.B. 1921, p. 27). On the other hand, banks of absolutely sweet waters, both stagnant and flowing, have been strongly emphasized (West 1940, p. 16; RTT 1908, p. 120; MEY 1943, p. 286; probably one locality in England also, E.M.M. 1930, p. 219). As underscored by HOR (1941, p. 156), however, it occurs in nonsaline places "only very sporadically and rarely". The sighting of a specimen "on a sheep salt lick" (E.B. 1930, p. 151) is interesting. The species is actually halophilous (HOR l.c.; MEY l.c.; BUR 1939, p. 83) and its omission in LNG's work (1929) is strange.

## Biology

Swedish catches: III: 1; IV: 3; V: 9; VI: 19; VII: 9; VIII: 3; IX: 1; X: 1. In Denmark, with extensive material, a sharp maximum abundance occurs in May, with a gradual decline in the summer months (LRS 1939, p. 324). In Germany also found during winter in large numbers (Rapp 1933, p. 45). As assumed by LRS (l.c., p. 380), it is certainly a spring breeder, hibernating as an adult.

## Dynamics

Wings fully developed. Spontaneous flight observed, August 7, 1936, during hot sunshine in Skå Kungstorp (LTH), and also in Hungary (HST, E.N. 1876, p. 79).

## Variation

In northern Europe only *forma typica* found. In the Mediterranean region and in the Caucasus separate subspecies exist.

*\*Bembidion (Peryphus) monticola* Sturm.

Distribution

(maps in NET and DEV, E.B. 1914; PME and PFF 1943, p. 184)

*Finland:* Only four localities, of which two completely isolated: Ik Metsäpirtti, Viisjoki, July 7, 1923, 1 specimen (STN, N.E. 1935, p. 119!); Uusikirkko, Lintula-å, May 30, 1937, 1 specimen (KNG). Ab Pusula, July 5, 1916, 2 specimens (LBÅ; HLL 1920, p. 274; N.E. 1930, p. 74!). Kb Juuka, Halivaara, June 18, 1941, 1 specimen (KRG!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* Denmark, two localities in southern Jylland (West 1940, p. 14). In Estonia only one specimen on a river bank near Kolu, July 7, 1937 (Miländer, det. HAB). In Latvia one specimen near Paplaka, September 21, 1924, on a brook (LCK and MIK 1939, p. 52). In Leningrad region not known to the best of my knowledge. British Isles (Joy 1932, p. 342), also Ireland (JHS and HLB 1902, p. 584).

*Total area:* Euro-Caucasian species. In Central Europe predominantly montane, south as far as northern Spain (FUE 1919, p. 69), central Italy (LUI 1929, p. 61), Yugoslavia (APF 1904, p. 99). East as far as Poland (NET 1929, p. 31) and Slovakia (ROU 1930, p. 120), Transylvania (PTI 1912, p. 16), Russia, Khar'kov (JAC 1905–1908, p. 286; not included by NET and DEV, E.B. 1914). The Caucasus (NET and DEV, l.c.).

Ecology

The few Finnish records are all from the banks of small rivers in more or less shaded places, where the soil consists of fine-grained sand ("mjäla") or of loam, and the vegetation is very sparse; lives right next to water. In Denmark the recorded localities seem to be quite similar (LRS 1939, p. 378; West 1940, p. 14). In Central Europe predominantly a montane species, "in deciduous forests on stony, metalled banks of brooks with loamy subsoil" (HOR 1935, p. 25). On the British Isles likewise principally "in hilly and mountainous districts" and in similar ecological conditions (FWL 1887, p. 112).

Biology

In northern Central Europe most of the catches have been made in September, when an immature beetle was also found in Denmark. From this LRS (1939, pp. 323, 378) has concluded that the species breeds in spring and hibernates as an adult. The report of an attack on forest seeds in Austria (D.E.Z. 1879, p. 417) requires confirmation.



## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

250

\**Bembidion (Neja) nigricorne* Gyll.

## Distribution

*Sweden*: A rarity of the first order, for which only four localities are definite: Hll Fjärås, 4 specimens, among others May 23, 1895 (ERC, E.T. 1896, p. 260; 2 specimens, MG! According to a note, two other given away). Vgl (GYL, according to THS 1859, p. 204; FHR, VA!). Göteborg, Sanna, September 2, 1909, 1 specimen, on sandy *Calluna* soil (SDN, MG! and verbal communication). Nke Laxå, on sandy soil south of the railway station, August 12–13, 1900, 1 specimen (RMN, RM!). Hls Los, sandy *Calluna* soil, September 11, 1926, 1 specimen (SJB, coll. LTH).

Erroneous: Skå, two localities (MCH, E.T. 1901, p. 142; actually only a *lampros* with dark antennae). Dlr Säter (AND, according to GLL 1896, p. 13; not present in coll. AND, LF). Regarding the record by ZTT (1840, p. 25) see LTH 1938 (p. 13).

*Norway*: Species absent. All records relate to dark *lampros* (MST, N.E.T. 1933, p. 270).

*Finland*: Two separate areas but not very consistent. I. South: Ik Terijoki (STN!); Sa Joutseno (SBJ 1873, p. 82); Ab Lojo, August 24, 1915 (LBÅ! Also according to Frey 1916, p. 139; KRG); Ta Hattula (WEG); Ruovesi, Siikakangas, numerous (KNG, S.H.A. 1935, p. 63; PME, *ibid.*, 1939, p. 59). II. Belt across central Finland: Om Brahestad, May 19, 1909 (WUO 1910, p. 64; MÅ!); Ob Uleåborg (WEG); Ok Säräisniemi, June 14, 1909 (WUO l.c.; MÅ!); Kajana (HLL, MH!); Suomussalmi and Ruhtinassalmi, in large numbers (SSK, numerous collections!).

*Russian sector*: Earlier only an old, doubtful record from southern Karelia (SBJ 1873, p. 82; MÅ!); in 1942 and 1943 found near Kn Karhumäki (PRT! KRV).

*Adjacent regions*: In Denmark very rare and found in only three localities in Jylland (West 1940, p. 12). In Estonia found only near Öismae on the northern coast (HAB in litt.). In Latvia 1 specimen near Libau, September 24, 1936 (LCK and MIK 1939, p. 51). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 340), also Ireland (OMH 1929, p. 24).

*Total area*: Solely European species with restricted distribution. South as far as Belgium (JEA 1941–1942, p. 539), central Germany and Upper Silesia (HOR 1941, p. 119.<sup>15</sup> East as far as Warsaw (MEY 1943, p. 276). In Russia,

<sup>15</sup>MW(!) contains one specimen from Spain (wrongly labeled?).

the species seems to occur only in Karelia and the Leningrad region.

251

### Ecology

All records from Fennoscandia, as well as those from other countries, show that this species occurs exclusively on soil covered with *Calluna*. Observations diverge only to the extent that on the one hand (constantly with us) it lives on dry sand (E.B. 1911, p. 18; 1927, p. 94; 1936, p. 38; BRN and PTZ 1933, p. 236; FWL 1887, p. 110), and both in Finland (PME, S.H.A. 1939, pp. 54, 59) and in Germany (E.B. 1911, p. 18) found together with *Amara infima*; on the other hand reported even for humid moorland (E.B. 1927, p. 156; 1930, p. 186; SRN 1926, p. 14; HOR 1937, p. 9), and found, among others, together with *humerali*. Apparently this type of occurrence is also true of colder northern and western parts of the area. By and large the insect has been recorded for more or less barren soil (except with *Calluna*), and in Finland also in a *Calluna* heath rich in lichens and covered with dry grasses (PME l.c.).

### Biology

The few Danish specimens were collected in April–May and August–September (LRS 1939, p. 321). In Fennoscandia likewise I know of no records in July and only one (Ok Säräisniemi) in June. The specimen from Hls Los, September 11, 1926, is immature. Hence the species is certainly a spring breeder, hibernating as an adult; this has been established in Poland (NET, E.B. 1926, p. 119). In captivity feeding on flies (NET l.c.).

### Dynamics

Exhibits wing dimorphism, but to date I have seen only one fully winged specimen (Göteborg). In the other specimens examined (Hls Los; Ok Suomussalmi; Germany; England) the wings are reduced to a very narrow rudiment that is just barely one-third the length of an elytron. Flight capacity of the macropterous form indicated by the record of a specimen “washed ashore” on Memmert Island (HOR 1941, p. 119).

\**Bembidion (Peryphus) nitidulum* Mrsh.  
(*rufipes* Gyll.)

### Distribution

252 *Sweden*: Predominantly a western species. Three subareas distinguishable, all connected with the continuous main area in Norway. I. Southernmost (and largest) region with these delimiting localities: Sk Ven, 1934 (Palm 1935, p. 8); Roslätt (THS, ML!); Södra-Sandby, 1935 (NYH!); Ringsjö region, numerous

(several collectors!); Röstånga (THS 1867a, p. 20; 1867b, p. 40; MB! MLF, MG!); Små Burseryd, Hällabäck, 1936, 1 specimen (LTH); Uppgränna, 1933, 2 specimens (LTH); Ögl Omberg, 1931, 2 specimens (Palm); Vm Fryksta, 1933, 4 specimens (LTH); Dsl Berga, 1943, (BGW!); Ed, 1934 (SVS, det. JNS). II. Jtl (BOH, 2 specimens, RM! However, cf. *lunatum*), Vallbo, July 15, 1935, 1 specimen (RNG, ML!); Ragunda (FRI, 1 specimen RM!). III. Lyl Sorsele, Tjulträsk, August 6, 1928, 4 specimens (GTZ, E.T. 1932, p. 48!), August 28, 1931, 1 specimen (GTZ!).

Doubtful: Upl (GLL 1896, p. 11). Stockholm region (NBL 1840, p. 204).

Erroneous: Nke Hammar (WNG, E.T. 1880, p. 192, "*rufipes*" = *properans*, KF!).

*Norway*: Mainly in the coastal regions and apparently avoids the eastern valleys in particular. The area may be continuous, although the map shows a gap between latitude 64° N and the Polar Circle. Northernmost localities: 32 Svartisvatn, several specimens, close to the glacier (STA, JEN); Furulund, July 1, 1925, 1 specimen (LTH); 31 Bodö, 1 specimen (MST, N.E.T. 1930, p. 354), June 1925, numerous on loam on the sea (LTH). Definite records from the inland in the south: 16 Saude (MST); 23 Grindaheim (MST); 24 Kongsvoll in Dovre (SIE 1875, p. 86).

Erroneous: 41 Neiden in southern Varanger (N.E.T. 1930, p. 354, = *grapeioides*, MO!).

*Finland*: Found only in the east. I. Several localities in the Isthmus of Karelia (several collectors!), north as far as Ik Sakkola (PRT). II. Two localities in Kb: Liperi, June 1940, 1 specimen (PME); Polvijärvi, 1938, 1 specimen (PHJ!).

*Russian sector*: Sv Uslanka and Kuujärvi along the Mäkriänjoki, 1943 (PFF, S.H.A. 1943, p. 136).

*Adjacent regions*: In Denmark widely distributed (also on Bornholm) but not frequent (West 1940, p. 14). In Estonia 2 specimens in the southeast near Liivamae, May 31, 1938 (HAB in litt.); additionally I saw two females (coll. STK) from Petseri (COL), which correspond to the subspecies *incognitum* Müll. (*alpinum* Dej.) in deeply blackened antennae and faintly striated-punctate elytra. In Latvia two localities (MIK 1905). Leningrad region (OBT 1876; JAC 1908; BSK 1908a). British Isles (Joy 1932, p. 342), also Ireland (JHS and HLB 1902, p. 583).

253 *Total area*: Western Palearctic species. In Europe south as far as central France (DEV 1935, p. 26), southern Italy (LUI 1929, p. 61), Greece (OTZ 1886, p. 205). As far as the Carpathians (ROU 1903, p. 121), Khar'kov, and Moscow (JAC 1905–1908, p. 286). Northern Africa (BED 1895–1914, p. 66). Asia Minor (ECH 1922, p. 32). The Caucasus (CHD 1846, p. 204; SDR and LDR 1878, p. 85).

### Ecology

A species dependent on loam which, however, also occurs on loam-mixed sand or humus. With us especially in loam or sand pits at places moderately to highly shaded, where the soil is humid due to trickling water; however the outermost surface is often dry and forms fissures that provide an excellent hiding place for the insects. Vegetation very sparse (frequently *Tussilago*) or totally absent. Less often on similar banks of smaller bodies of flowing water in Scandinavia; sporadically also in beech forests. In Finland, on the other hand, an almost stenotopic riparian species of rivers, on humid loamy precipices (PME and PFF 1943, p. 136). This type of occurrence also seems to be frequent in Central Europe (see SRN 1926, p. 15; Dahl 1928, p. 77; HOR 1937, p. 14; 1941, p. 135). In Denmark and northern Germany also in beech forests (West 1940, p. 14; GRD 1937, p. 40). The occurrence in loam pits, for example in brickworks, is also obligatory in Central Europe (K.R. 1912, p. 42; Dahl l.c.; NBG 1929, p. 123; HOR 1937, p. 14). A strange occurrence is the one near 32 Svartisvatn, in the immediate proximity of the glacier, although below the timber line (STA in litt.). Otherwise the species seems never to have been an inhabitant of the *reg. bet.*

### Biology

Dated Swedish catches: IV: 1; V: 9; VI: 7; VII: 4; VIII: 4; IX: 1. In Denmark, where there is rich material, the maximum abundance is reached in June (LRS 1939, p. 323). Immature beetles also recorded in Denmark in July and September, in Scandinavia on July 27 (Boh) and August 3 (Trondheim). Spring breeder, hibernating as an adult. In Denmark beetles have been observed feeding on larvae of flies and trichopterans on thoroughly soaked, chalky precipices (SDT 1861, p. 165).

### Dynamics

Wings fully developed. Numerous beetles observed flying to light in France (*Ann. Soc. Ent. Fr.*, 1881, p. lxxxvii).

### Variation

In Central and southern Europe there are many forms, some of which are difficult to define. In our region only the *forma typica* is found.

### Fossil Record ?

France, "lignites quaternaires"; doubtful identification (FLC 1875, p. 1234).



\**Bembidion (Notaphus) obliquum* Sturm.

Distribution

*Sweden:* Except in the fjeld regions, distributed throughout the country continuously and almost uniformly. Upper delimiting localities: Dlr Idre, Töfssingdalen (FRL!); Hjd Linsäll (BRC!); Jtl Hallen, Dammån, several specimens (BGW!); Ång Tåsjö, 3 specimens (BRC, RM!); Åsl Åsele, 4 specimens (LTH); Lyl Lycksele (ZTT 1840, p. 26; ML!); Rusksele, 1 specimen (HEQ!); Nbt Älvsbyn, 1 specimen (LTH and Palm 1934, p. 35!); Edeforsen, numerous (LTH); Tärendö, 1 specimen (LTH); Lul Pålhem, 2 specimens (WRN!); Ullatti, 1 specimen (LTH). Isolated and certainly accidental: Tol Abisko, bank of Torneträsk, July 19, 1939, 1 specimen (LTH).

*Norway:* Chiefly in the southeast plain, where it is frequent. Along the southern and southwestern coast probably continuously distributed right into the montane region (several localities; SPS 1901, p. 34; N.E.T. 1930, p. 338). In the river valleys extends fairly deep toward the inland: 22 Mjösvatn; 12 Gjövik, 13 Fåberg (SIE 1875, p. 86). Three localities isolated in the Trondheim region: 27 Trondheim (also 1933, LBÅ!); Orkedal; 28 Hell in Stjørdal (N.E.T. 1923, p. 276; 1937, p. 145).

*Finland:* Except for the extreme northernmost parts, almost universally distributed and usually very frequent. Northernmost localities: Le Enontekis (STN!); Li Enare, 1937, 1 specimen (NDM!); Ivalojoiki (PPP 1905, p. 89; MH!); Lp Lutto, 5 specimens (PFF, N.E. 1942, p. 65); Nautsi (LNN, 1 specimen, MÅ!).

*Russian sector:* In the southern part of Kola Peninsula, four localities between Lm Hirvasjärvi and Lj Pjalitsa (PPP 1905, p. 89). Farther, near Kk Soukelo (PPP l.c.; MH!). In southern Karelia frequent (several collectors!), north as far as Kc Soroka (SBJ, MÅ!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) 255 but not frequent (West 1940, p. 13). Estonia (including Dagö) widely distributed (several collectors!); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles, very rare, found neither in Ireland nor in Scotland (Joy 1932, p. 338).

*Total area:* Palearctic species. In Europe south as far as northern France (DEV 1935, p. 24), northern Italy (LUI 1929, p. 60), Hungary (KTY 1900, p. 27), becoming gradually scarcer toward the south. In the northeast as far as Pechora (SBJ 1898, p. 338). The Caucasus (SDR and LDR 1878, p. 85). Siberia (among others, SBJ 1880, p. 15; RM!), east as far as Lena (PPP 1906b, p. 28) and Amur (HEY 1880–1881, p. 51).

Ecology

Exclusive riparian species, found along both stagnant and flowing waters, large

as well as very small water bodies, and on the shores of the Baltic Sea and the Gulf of Bothnia; its occurrence on barren seashore is only accidental. On loam or "dy"† (preferably with a strong admixture of humus), or on loam-mixed sand and peat, especially on very soft, wet soil, sometimes by the side of dirty water which often smells strongly of  $H_2S$ . The principal prerequisite is sufficient vegetation of *Carex*, swamp grasses, *Equisetum*, *Juncus*, and similar plants, but during sunshine the carabid prefers to stay on more or less bald patches. In *Sphagnum* occurs only singly, and along markedly eutrophic lakes usually falls behind other species of *Bembidion*. In Central Europe the mode of life is entirely identical, but southward an increasing predilection for marshy soil apparent (Peus 1928, p. 576; HOR 1941, p. 126).

### Biology

Southern Swedish catches: II: 1; III: 0; IV: 4; V: 57; VI: 134; VII: 51; VIII: 23; IX: 5; X: 1. In Denmark maximum abundance in June and late appearance in spring likewise pronounced. Immature beetles were observed, however, on July 13 (Vbt) and July 25 (Boh). Nevertheless it may be a spring breeder, hibernating as an adult. But its place of winter hibernation still remains unknown. Beetles observed feeding on Collembola (GRD 1937, p. 28).

### Dynamics

Wings fully developed and the insect is an active flier during sunshine. Several flight observations (Ble, Gtl, Vgl, Nbt, Lul). In Finland found in very large numbers in sea drift (PME 1944, p. 37).

### Variation

Highly variable in color. I have seen specimens of the distinct aberration *frey-muthi* Wgn. (E.M.D. 1915, p. 307; 1916, p. 223) from Öld. The "aberration *immaculatum* J. Sahlb." is connected through several intermediate variations with the *forma typica* (there are actually no completely unspotted individuals), and hence does not merit a name. In the specimens from Jtl and Mdp the yellow elytral pattern is especially sharp and extensive, so that among the others the posterior main band toward the inner side usually reaches the second interstice.

### Fossil Record

Galicia, glacial (SCL 1916, p. 47).

† (cf. page 46; suppl. scient. edit.).

*\*Bembidion (Phila) obtusum* Serv.

Distribution  
(map by NET, E.B. 1931)

*Sweden*: Predominantly a southern species, found mainly on the coast. In Western Skå not rare; delimiting localities: Ystad (AMM, ML!); Bjäresjö, 1884 (leg.?, ML!); Ringsjö region, numerous (MLC, Roth, several collections!); Skälderviken (RNG, E.T. 1921, p. 73), Ängelholm, 1937 (LBÅ!). Hll Halmstad, 1915, 2 specimens (FGQ!), October 7, 1929 (WSL!); Släp and Särö (several collectors!). Vgl Göteborg, Slottsskogen, June 1869, several specimens (SDN manuscript; 1 specimen MG!). Boh Öckerö, September 1908, several specimens (SDN manuscript; 3 specimens, MG!); Koön, 1943 (SJB). Eastern coast: Små Kalmar (WLN, LG!). Öld, four localities between Köping and Högsrum (several collectors! Said to be found first by BOH; manuscript in K.V. Ak.). Gtl, widely distributed but not frequent, north as far as Irevik, May 29, 1940, 4 specimens (LTH).

Erroneous: Små Ålhem (BOH 1851, p. 63; 2 specimens, "Sm" RM = *unicolor*!). Stockholm (GLL 1896, p. 403; 1 specimen, BOH, RM = *unicolor*!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark (including Bornholm) widely distributed and frequent (West 1940, p. 17). In Estonia near Tickhof on Ösel (SZL 1937, p. 248); otherwise not known in the Baltic States as well as in Leningrad region. British Isles (Joy 1932, p. 336), also Ireland (JHS and HLB 1902, p. 581).

*Total area*: Solely European species, predominantly western. South as far as central Spain (GRI 1931, p. 56), southern France (DEV 1935, p. 27), and 257 Hungary (KTY 1900, p. 28). East as far as Slovakia (ROU 1930, p. 128), Poland (LMN 1913, p. 55) and Moscow (according to JAC 1905–1908, p. 291). Records from the Caucasus (SDR and LDR 1878, p. 84) and Kirgizia (HEY 1880–1881, p. 48) require verification. In the Mediterranean region (except southern France and Spain) only other species occur (GRI l.c.). According to JEA (1941–1942, p. 536) who was evidently unaware of the monograph by GRI (1931), *obtusum* is also found in northern Africa, which is quite doubtful.

Ecology

This species has nothing to do with shores. It lives on open or moderately shaded loamy soil, which is fairly dry, at least on the surface. In our region usually occurs in cultivated fields, such as cereal and potato fields, where it has a predilection for living under cereal waste and stacks of herbs, even in greenhouse beds. On Öld and Gtl also on loamy and not too dry Alvar† soil.

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



Occurrence in Central Europe corresponds completely. Hence the species lives almost exclusively on cultivated loamy soil (see SDT 1841, p. 331; E.B. 1927, p. 160; Dahl 1928, p. 59; NBG 1933, p. 51; HOR 1937, p. 25; 1941, p. 162; MEY 1943, p. 276). Solitary specimens have been found in Germany in nests of *Cricetus* (E.B. 1909, p. 147); there may be no actual dependence.

### Biology

Swedish catches: III: 7; IV: 6; V: 13; VI: 8; VII: 2; VIII: 12; IX: 13; X: 2. In Denmark maximum abundance already in June (IRS 1939, p. 322). Immature beetles occur in August between August 8 (Öld) and August 30 (Gtl). Spring breeder, hibernating as an adult. Hibernating beetles have been observed, especially in Germany (Rapp 1933, p. 51).

### Dynamics

Wing dimorphism evident. In brachypterous specimens the wings are reduced to an extremely small rudiment that is macroscopically barely visible. The macropterous form is fully winged and certainly capable of flight. An indication of this is the record "in gas water" in Elberfeld (CRN 1884, p. 9; see p. 15 above).

### Fossil Record

France, "lignites quaternaires" (FLC 1875, p. 1234).

258

*\*Bembidion (Trepanes) octomaculatum* Gze.  
(*sturmi* Panz.)

### Distribution

*Sweden*: Certainly only accidental in occurrence, since just two solitary specimens have been found on the southern coast of Skå: Sandhammaren, June 23, 1860 (THS 1867a, p. 22; "subfucis," MB!); Trälleborg (THS, MB!).

*Norway*: Absent.

*Finland*: First discovered in recent years from two localities in the southwest by PME (S.H.A. 1939, p. 219): Nl Tuusula, river bank, May 1939, 1 specimen (!); Ekenäs, Klovaskär, accidentally on the seashore, June 12, June 27, 1939, 1 specimen each.

*Russian sector*: No records.

*Adjacent regions*: In Denmark only one specimen collected on the seashore near Ronne on Bornholm, June 5, 1857 (West 1940, p. 17). According to SDL (1891, p. 71) recorded in the Baltic States; not rediscovered later. Leningrad region (OBT 1876), Jamburg (BSK 1908a, p. xl). British Isles (Joy 1932, p. 337).



*Total area:* Palearctic species. In Europe south as far as Portugal, southern Spain, the Balearic Islands (FUE 1919, p. 75), southern Italy, Sardinia, Sicily (LUI 1929, p. 67), Greece and Crete (OTZ 1886, p. 205). East as far as Transylvania (PTI 1912, p. 18). In western Germany (HOR 1937, p. 25; 1941, p. 160), now only more or less sporadic, earlier more frequent. Northern Africa (BED 1895–1914, p. 69). Asia Minor (NET 1921, p. 220). Syria (MÜL 1918, p. 115). The Caucasus (JAC 1905–1908, p. 290; LSH 1936, p. 139). Kirgizia (HEY 1880–1881, p. 49). Trans-Caspian region (JAC l.c.). Western Turkestan (HEY 1896, p. 10). Western Siberia (HEY 1880–1881, p. 49; JAC l.c.).

### Ecology

In Central Europe, exclusively a riparian species, but also found at very small ponds and puddles, which often dry up in summer. Also on river banks, in Bohemia in peat bogs (ROU 1934, p. 76). Prefers muddy soil with some shade, not rare at swampy forest places (MLL 1862, p. 94; LTZ 1885–1892, p. 12; Dahl 1928, p. 69; GRD 1937, p. 42; HOR 1937 and 1941). In certain regions the species seems to show a predilection for saline places (B.E.Z. 1861, p. 186; NET and VOG 1916, p. 68), but can hardly be called halophilous.

259

### Biology

Possibly hibernates as an adult. In Thuringia (Rapp 1933, p. 50) numerous catches were made in early spring as well as late autumn (until December).

### Dynamics

Wings fully developed and undoubtedly functional. Sporadic occurrences on the Swedish, Finnish, and Danish coasts undoubtedly individuals that strayed in flight. The species tends to transmigrate into new regions.

### *\*Bembidion (Actedium) pallidipenne* Ill.

#### Distribution

(map in NET 1913b)

*Sweden:* Exclusively on seashore in the south, except for three localities in Skå. In the west, delimiting localities of the continuous area: Vgl Göteborg (EKB, 1 specimen, MG!); Hisingen, sand pit near Sannegården, 1 specimen (AGR!); Hll Släp and Särö (WIB, ML!); Fjärås (SDN, 2 specimens, MG!). In the east: Ble Hällevik, July 1936 (SJB); Små Kalmar (leg.? 4 specimens, MG!). Öld, four localities, on lake Hornsjön particularly numerous (several collectors!). Gtl, six localities, as well as on Fårön (several collectors!) and Sandön (JNS 1925, p. 67!). Inland localities in Skå: Ivösjön, July 6, 1851, 3

specimens (BOH 1851, p. 63); Ringsjön (several collectors!); Herrevadskloster (Roth, E.T. 1896, p. 276).

Erroneous: Hls (leg.?, MU!).

Norway: Exclusively on the southern coast. 1 Havler, Örkroken in Kirkeöy, May 31, June 9, 1914 (N.E.T. 1923, p. 255). 5 Kristiansand and Søgne (N.E.T., l.c.); Lister, collected many times (MO!). 6, many localities in Jaeren, frequent (HLS 1915, p. 15; MO!).

Finland and Russian sector: No records.

Adjacent regions: In Denmark widely distributed (including Bornholm) but local and hardly frequent in Jylland and on Sjaælland also on inland waters (West 1940, p. 12). Not found in Estonia; contrarily, three localities in Latvia, on the western coast of Kurland (MIK 1905; LCK and MIK 1939), according to ULN (1884, p. 15) also in the inland of the Orient; apparently, it is this statement that is contradicted by JAC (1905–1908, p. 281; "Witebsk"). Not found in Leningrad region. British Isles (Joy 1932, p. 337), also Ireland (JHS and HLB 1902, p. 586).

Total area: Solely European species, predominantly western. On the seashores south as far as Portugal (FUE 1919, p. 62). Inland only on Ireland, near lake Plön in Holstein (HOR 1941, p. 122), possibly also along lake Drewenz in eastern Prussia (MEY, E.B. 1938, p. 88; not accepted by HOR 1941).

### Ecology

Halophilous species (LNG 1929, p. 45), but not a halobiont (HOR 1941, p. 122), occurring principally on the seashore. However, records on shores of lakes with completely fresh water are rather numerous: Skå (on 3 lakes); Öld Hornsjön; Norway, 6 Jæren, Harpestadvatn (HLS 1915, p. 15). Also in Denmark, northern Germany, and Ireland. Lives in open, sandy, barren places or those with only patches of *Atriplex*, *Honckenya*, and similar plants, in the immediate vicinity of water. Regular successive species, at any rate at the sea: *Dyschirius obscurus* and *D. thoracicus*, *Bledius arenarius* Payk., and a few others. Digs short tunnels in sand (LRN 1936, p. 131).

### Biology

Swedish catches: V: 3; VI: 22; VII: 18; VIII: 6. Immature beetles from July 16 (Öld) to August 14 (Gtl). In Denmark adults already numerous in May, and larvae found from May to July (LRS 1939, p. 322). The species hibernates exclusively as an adult (LRN 1936, p. 131). In Denmark observed attacking and consuming *Bledius arenarius* Payk. and *Heterocerus hispidulus* Kies. (LRN l.c.).

## Dynamics

LRN (l.c.) assumes wing dimorphism in the species. From Sweden I have seen only macropterous specimens. Flight observed in captivity (LRN l.c.).

## Variation

According to FCK (E.B. 1936, p. 232) and MEY (E.B. 1938, p. 88) "the Baltic Sea race" is larger and more sharply delineated than that of the North Sea. In Sweden no such differences are discernible between individuals from the east and west coasts.

261

*\*Bembidion (Plataphus) prasinum* Dft.  
(*olivaceum* Gyll.)

Distribution  
(map by NET 1913b)

*Sweden:* Lives in the high boreal coniferous forest region, only rarely in actual fjelds; on the other hand does not reach the Bothnian coastland at any place. Very localized but frequent at places. Delimiting localities: Vrm Vingång (numerous) and Långflon, June 1933 (Palm and LTH 1937, p. 117!); Dlr Gustafs, Solvarbo, along the Dalälven, June 4, 1936, 1 specimen, possibly only accidental (KLF!); Lima, May 28, 1934, 2 specimens (TJB!); Hls Ljusdal, 2 specimens (leg.? RM!); Kårböle, Strandbodarna, 1942, 1 specimen (LBL, RM!); Jtl Bispgården, 1930, 4 specimens (LTH and Palm 1934, p. 35!); Ång Forsmo, 1940, several specimens (BRD, coll. LTH); Vbt Vindeln, 1930, 1 specimen (LTH and Palm, l.c.!); Nbt Ålvsbyn, 1930, 1 specimen (LTH and Palm, l.c.!); Edeforsen, 1938, 1 specimen (LTH); Pajala, Anttis, 1938, 3 specimens (LTH).

*Norway:* Distributed almost throughout the country except the actual western part and northernmost peninsulas. Southern Norwegian delimiting localities toward the west: 6 Örsdalsvatn in Bjerkreim (HLS 1915, p. 17); 6 Seljord and Vestfjorddal (MST); 23 Grindaheim (MST); 19 Lærdal (CTT); Lærdal-søyri (MST); 24 Tallerås-bru (HSS, according to STA); Dovre, Kongsvoll (SIE 1875, p. 86); 27 Sokna in Støren (MST); Trondheim (N.E.T. 1937, p. 145). Northernmost localities at about latitude 70° N in Alta, Porsanger, and Tana regions.

*Finland:* Only in the north, where it is distributed uninterruptedly south as far as about latitude 66° N. Southernmost localities: Ob Kemi (SAA, FA!); Rovaniemi (WEG! STN); Ks Kuusamo (Frey, MH!); Paanajärvi (STN! PFF).

*Russian sector:* In the western part of Kola Peninsula four localities (PPP 1905, p. 90; MH! MÅ!), also near Lv Varsuga (PPP l.c.; MH!). Also near Kk Soukelo (PPP l.c.; MH!) in northernmost Karelia.

Erroneous: Lj Ponoj (PPP, l.c. = *hyperboraeorum*, MH!).

*Adjacent regions:* Neither found in Denmark<sup>16</sup> nor the Baltic States. British Isles (Joy 1932, p. 338).

*Total area:* Palearctic species. In Europe boreo-montane, south as far as southern France (DEV 1935, p. 24), northern Italy (LUI 1929, p. 60), northern Yugoslavia (NET 1913b); north as far as Hildesheim and Harz (HOR 1941, p. 128); east as far as Hungary (KTY 1900, p. 27) and Slovakia (ROU 1930, p. 119); northeast as far as Pinega (KLM, MH!) and Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308); not found in the rest of Russia. The Caucasus (LDR, MW!). Siberia (among others, SBJ 1880, p. 15; RM! PPP 1907d, p. 6; NET 1913b) right into the eastern regions (HEY 1880–1881, p. 51; Lena, PPP, MH!).

### Ecology

Stenotopic for banks of fresh water bodies consisting of coarse gravel and completely barren. In our region quite predominantly at larger rivers, less often at brooks or lakes (HLS 1915, p. 17; also near Tol Torneträsk, LTH). The species is highly hygrophilous and lives immediately next to water. Especially in Norway, often found together with *virens*, in Sweden sometimes with *saxatile*. The species occurs principally in the high boreal coniferous forest region, but also appears regularly in the *reg. bet.*; within the *reg. alp.* only two solitary individuals have been found: Hjd Gröndalen, July 22, 1938 (BRK!); Jtl Storsnasen, June 16, 1934 (LTH). Contrarily, found near Pechora and Yenisey in the tundra region (PPP 1910a, p. 312). In Central Europe occurs under the same conditions as with us (see especially HOR 1937, p. 12), except that, unlike in our region, it has also been recorded from silted up regions.

### Biology

Swedish catches made in June and July except for one record each in May and September. Numerous immature beetles found at the end of July (Nbt) and on September 17 (Ång). It thus certainly hibernates as an adult (at least in part).

### Dynamics

Wings fully developed. Spontaneous flight observed on June 13, 1933, near Vrm Vingäng (LTH).

<sup>16</sup>An erroneous record from Denmark (see LTH 1943a, p. 12).



## Variation

In northern Europe more or less uniformly rufous ("aberration *kolströmi* C.R. Sahlb.").

\**Bembidion (Metallina) properans* Steph.  
(*quatuordecimstriatum* Thoms., *velox* Er. nec L.)

## Distribution

Incompletely known due to the erstwhile confusion with *lampros*.

263 *Sweden*: In southern and central Sweden widely distributed but probably missing in the southern Swedish highland, and on the eastern coast only a few records to date. Northernmost localities: Vrm Fastnäs, 1933 (LTH); Dlr Stora-Tuna (KLF, ML!); Sater (AND, LF!); Upl Häverö, Utsund, 1943 (H. Undén!).

*Norway*: In the southeast widely distributed, west as far as 4 Kragerö and 15 Noresund. Farther north, three localities in 13 and 24, of which Otta in Sel and Lalm are supported by voucher specimens (MO!).

*Finland*: In the south widely and probably uninterruptedly distributed; the gap on the southern coast might be only apparent. Northernmost definite localities: Oa Lappo (WST, MH!); Sb Kuopio (MKL, MH! PTK, MA! WLL!); Kb Eno (ENW, MH!).

*Russian sector*: In southern Karelia several localities and at places more frequent than *lampros*, north as far as Kn Karhumäki (PRT! CRP, coll. LBG!).

*Adjacent regions*: In Denmark widely distributed but not recorded to date on Bornholm (West 1940, p. 12). In Estonia, including Ösel and Dagö, widely distributed (several collectors!); Latvia (among others, coll. LBG!). Leningrad region (according to OBT 1876). British Isles (Joy 1932, p. 340), also Ireland (OMH 1929, p. 24).

*Total area*: Palearctic species. The total area of distribution is insufficiently known due to the recent taxonomic separation from *lampros*. In Europe south purportedly as far as Portugal (FUE 1919, p. 60), southern Italy (LUI 1929, p. 59), Greece and Crete (OTZ 1886, p. 205). East at least as far as southern Poland and Slovakia (ROU 1930, p. 117). The Caucasus (CHD 1846, p. 204, "*velox*"; ECH 1930a, p. 144; 1930b, p. 215). Siberia (among others, SBJ 1880, p. 19; RM!) east as far as Trans-Baikal (MDL 1931, p. 4) and Amur (HEY 1893, p. 15).

## Ecology

The species differs from *lampros*, with which it often occurs together, in being less eurytopic. Like *lampros*, found in open sun exposed places with sparse vegetation, but always on loamy or at least loam-mixed soil that is not too dry. Hence more than *lampros*, found in the vicinity of water, for example,

in Finland often on river banks (N.E. 1923, p. 118; PME and PFF 1943, p. 133). Near Helsinki HLQ (in litt.) has made a detailed study of a biotope in which *properans* is frequent. It is an old gravel pit and the species lived in the middle of a steep loam-mixed fine-sand precipice facing east, at the edge of the vegetation cover. Successive species, among others, *Microlestes minutulus* and *Melanimon tibiale* Fbr. In Central Europe, among other places, in river valleys (HOR 1941, p. 119); in northern Italy, more so than *lampros*, an insect of the plains (MÜL 1926, p. 78).

### Biology

Swedish catches: I: 1; II: 0; III: 3; IV: 3; V: 13; VI: 23; VII: 4; VIII: 8; IX: 3. The sharp decline in July is especially conspicuous. An incompletely hardened beetle was collected on August 7, 1936 (Skå). Certainly a spring breeder, hibernating as an adult.

### Dynamics

The species was previously considered by me (LTH 1939–1940, p. 72) exclusively brachypterous. Later, however, I saw solitary macropterous specimens from Sweden, which are certainly capable of flight. Hence wing dimorphism present in this species.

### Fossil Record ?

Galicia, glacial (SCL 1916, p. 46); identification requires verification.

### *\*Bembidion (Princidium) punctulatum* Drap.

#### Distribution

(map in PME and PFF 1943, p. 179)

*Finland:* Only in the extreme southeast. In the Isthmus of Karelia many localities, and at some places frequent (KRG, N.E. 1923, p. 122), north as far as Ik Muolaa (KRG; PME, S.H.A. 1936, p. 150) and Metsäpirtti (KRG). Isolated near Ka Fredrikshamn, 1 specimen (PHJ!). East of Lake Ladoga, near Kl Salmis, numerous (PFF, N.E. 1938, pp. 126, 127).

*Russian sector:* Only in southernmost Karelia: Sv Segesanjoki, 1942 (PME); Vaaseni (PPP 1899a, p. 9; FA! KRV! PFF); Uslanka, 1943 (PFF); Kn Petrosavodsk (PPP l.c.; HLL 1921b, p. 84; MH!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* Absent in Denmark. In Estonia only at the Ahja River in the southeast, June 1, 1933, 2 specimens (HAB). In Latvia, four localities (ULN 1884; LCK in litt.). Leningrad region (OBT 1876; BSK 1929). British

Isles (Joy 1932, p. 337), frequent on Ireland (JHS and HLB 1902, p. 586).

265 *Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 61), Corsica (DEV 1935, p. 24), southern Italy, Sardinia, Sicily (LUI 1929, p. 59), Greece (OTZ 1886, p. 205). East as far as Ural (JAC 1905–1908, p. 281). Northern Africa (BED 1895–1914, p. 63). Asia Minor (MÜL 1918, p. 109). The Caucasus (SDR and LDR 1878, p. 85; MÜL l.c.). Kirgizia (HEY 1880–1881, p. 52).

### Ecology

Stenotopic riparian species; in eastern Fennoscandia mainly found on totally barren banks of gravel or scree, together with *bipunctatum* and *saxatile* (SBJ 1873, p. 74; PFF, N.E. 1938, p. 126; PME and PFF 1943, p. 134), but also on sandy banks, among others with *litorale* and *semipunctatum* (KRG, N.E. 1923, p. 122; 1925d, p. 13). In Central Europe exceptionally found at stagnant water (HOR 1941, p. 121), but in one such instance the water was a cut-off river pond (HOR 1935, p. 220). Furthermore on (usually totally barren) riversides of the types described above (see Dahl 1928, p. 61); exceptionally two specimens found on a muddy bank in Mecklenburg, together with *obliquum*, *varium*, and other species (GRD 1937, p. 68).

### Biology

In Germany predominantly a spring species, found usually from March to August (Rapp 1933, p. 37; BUR 1939, p. 86). It might well be assumed that hibernation takes place in the adult stage.

### Dynamics

The insect is macropterous and a very active flier (HOR, WGN, NET in litt.).

### Fossil Record ?

Eastern Prussia, late glacial; doubtful identification (SPR 1910, p. 118).

*\*Bembidion (Chlorodium) pygmaeum* Fbr.

### Distribution (map by NET 1923)

266 *Finland:* Only three localities. I. Isthmus of Karelia: Ik Uusikirkko, Vammeljoki, several specimens (KRG 1925a, p. 12; N.E. 1923, p. 121! KNG, PRT); Kivennapa (KNG). II. Nl Tvärminne Skärgård, sea drift, 1939, 1 specimen (PME 1944, p. 37!).

Erroneous: Al Finström (HLL 1921a, p. 33; oral communication).

*Russian sector:* Two localities in the extreme south: Sv Gorki, June 15, 1875 (PPP 1899a, p. 10); just north of the mouth of Swir, 1942, 1 specimen (KRH, N.E. 1943, p. 163!). Isolated near Kn Karhumäki, August 1943, 1 specimen (PRT!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* Missing in Denmark. Estonia, found to date only in the southern half (SUM 1931; Palm 1943! HAB and LCK, in litt.). In Latvia, three localities (LCK in litt.; coll. LBG!), Leningrad region (OBT 1876), Leningrad (coll. LBG!).

*Total area:* Solely European species, predominantly eastern. South as far as eastern Pyrenees (FUE 1919, p. 60), southern Italy (LUI 1929, p. 59), Yugoslavia (NET 1923). East as far as Slovakia (ROU 1930, p. 116), Transylvania (PTI 1912, p. 14), northern Rumania (NET l.c.), in Russia as far as Volga (NET l.c.). Not found in western France nor on the British Isles. Occurrence in Holland and Belgium (EVS 1898, p. 54) doubtful (NET l.c.). The record from Greece (OTZ 1886, p. 205) has not been included by NET (l.c.) and is therefore probably erroneous.

### Ecology

The mode of life of this species might be closest to *properans*. The few eastern Fennoscandian records indicate a stenotopic riparian species which lives on more or less dry fine sand or loamy scarps with sparse vegetation (among others, *Equisetum arvense*) at some distance from the water (KRG, N.E. 1923, p. 119; PME and PFF 1943, p. 133). In Central Europe only in montane regions, predominantly ripicolous (NET, K.R. 1912, p. 41; HOR 1941, p. 120), otherwise in no way bound to bodies of water, but occurs especially in brickworks and loam pits (see Dahl 1928, p. 58; NBG, E.B. 1937, p. 379), sometimes together with *illigeri*, and hence occurs in somewhat humid places (WGN, E.M.D. 1915, p. 243), sometimes drier, more or less sandy places (NET l.c.; MEY 1943, p. 275).

### Biology

In Germany occurs predominantly in spring and early summer (Rapp 1933, p. 36; BUR 1939, p. 87). Probably hibernates as an adult. According to BUR (l.c.) the species damages forest seeds in Germany.

### Dynamics

Wings fully developed with reflexed apical part. They are, of course, somewhat variable in size (in German specimens), and it is possible that not all individ-



uals are capable of flight. However, the specimen found in sea drift near Nl Tvärminne, far from the actual area of the species (PME 1944, p. 37), may be considered one that strayed in flight.

### Variation

Specimens with distinct preapical spot on the elytra have been designated var. *bilunulatum* Bielz and are especially frequent in the east (also found in Finland). This, however, is a very insignificant aberration, and the *forma typica* also occurs in the easternmost parts (Russia) (NET 1923; to the contrary, see JEA 1941–1942, p. 539).

### \**Bembidion (Lopha) quadrimaculatum* L.

#### Distribution

*Sweden*: Distributed almost throughout the country. In Upper Norrland, however, the species is found only in the plains. In the southeast characteristically very rare and only lately reported from Öld: Rälla, July 9, 1938, 2 specimens, Halltorp, March 1939, 1 specimen (BRC, RM!); July 17, 1939, 1 specimen (KLF!); Strandtorp, July 20, 1943, 1 specimen (ERL!); Byerum, seashore, June 5, 1943, 8 specimens (BRK!). Upper delimiting localities: Dlr Idre, 1927 (Sthen, coll. FRL!); Jtl Åre (ZTT, ML!); July 1934 (Holm, coll. LTH); Ång Hoting, 1936, 2 specimens (LTH); Vbt Hällnäs, 1935, 1940 (HEQ!); 1936 (LTH); Byske, 1936, 1 specimen (LTH); Nbt Älvsbyn, 1930, numerous (LTH and Palm 1934, p. 36!); Edeforsen, 1938, frequent (LTH); Lul Pålkem, 1940, 2 specimens; Porjus, 1939, 4 specimens; Ullatti, 1938, 2 specimens (LTH); Tol Vittangi, July 29, 1938, 1 specimen (LTH).

*Norway*: Predominantly an eastern species, very widely distributed and frequent in the southeast. Additionally, numerous localities in the Trondheim region, north as far as 28 Snåsa; 29 Namsos and Ottersøy (LYS in litt.); it is possible, however, that this area is continuous with the Swedish area in Jtl and not with the southern Norwegian area. Westernmost localities: 5 Kristiansand; 16 Triset on Lake Bandak; 15 Ål (STE, MB!); 14 Fossheimseter; Sörem in Vågå; Lågendalen in Dovre; 26 Hitra (LYS in litt.). Finally, extreme north near 39 Karasjok at the Finnish border (N.E.T. 1923, p. 255).

268 *Finland*: Almost universally distributed but fewer places in the high north (not found to date in Le). Northernmost localities: Lk Muonio (MER, MÅ!); Pallastunturi (KNG); Li Ivalo (KRV!); Lemmenjoki (HLL); Lp Lutto, numerous (PFF, N.E. 1942, p. 66); Yläluostari (KRV! STN; PFF).

*Russian sector*: Kola Peninsula, three localities in the west and south (PPP 1905, p. 91): Lt Lutto (MH!); Lm Kantalaks (SBJ 1873, p. 86); Lv Varsuga (MH! MÅ!). In Karelia certainly continuously distributed (frequent in the

south), but to date only two localities in the north, north as far as Kk Soukelo (PPP l.c.; MH!).

*Adjacent regions:* In Denmark widely distributed on the islands (including Bornholm) and fairly frequent, less so in Jylland, and on the west coast found to date only near Esbjerg (West 1940, p. 17, and in litt.). Estonia, including Dagö (SUM 1931; Palm! HAB in litt.); Latvia (SDL 1872); Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 339).

*Total area:* Circumpolar species. In Europe south as far as Portugal (FUE 1919, p. 74), southern Italy, Sicily (LUI 1929, p. 66), European Turkey (APF 1904, p. 109). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308). The Caucasus (CHD 1846, p. 209; SDR and LDR 1878, p. 84). Siberia (among others, SBJ 1880, p. 19; RM!), east as far as Lena (PPP 1906b, p. 33), Trans-Baikal and Ussuri (MDL 1931, p. 4). Northern Mongolia (PPP 1907d, p. 7). North America (Leng 1920, p. 52).

### Ecology

After *lampros*, with which it is usually found together, it is the least humidity-loving among our species of *Bembidion*. Frequently found on barren banks where it lives on the drier parts; yet also found in open, preferably cultivated fields, quite independent of water. On loam and sand or soil mixed with them. The primary requirement is very sparse, usually low vegetation that allows complete exposure to the sun. In Central Europe, more so than with us, loamy soil seems preferred (West 1940, p. 17; GRD 1937, p. 42); in Bohemia found even in peat bogs (ROU 1934, p. 76), which is an exception with us.

### Biology

Southern Swedish catches: III: 6; IV: 16; V: 39; VI: 69; VII: 44; VIII: 23; IX: 21; X: 4; XI: 5; XII: 1. In Denmark maximum abundance in July (LRS 269 1939, p. 324). Immature beetles from July 26 (Boh), July 29 (Jtl) to August 22 (Hls) and August 24 (Lul). Undoubtedly a spring breeder, hibernating as an adult. This species apparently attacks young plants of *Matthiola* (LBL 1928, p. 10) and *Pisum* (LBL 1927, p. 13) in Sweden, forest seeds in Germany (BUR 1939, p. 87), and strawberry leaves in North America (BLK 1925, p. 20). Normally, however, certainly carnivorous.

### Dynamics

Wings fully developed. Spontaneous flight observed near Boh Sämstad, July 1, 1944 (LTH), Vrm Lundsberg, May 23, 1943 (WRN), near Oslo, August 24, 1942 (STA), and in Germany (Rapp 1933, p. 47). Found in very large numbers

in sea drift in Finland (Frey 1937, p. 436; STÅ 1938, pp. 18, 20; PME 1944, p. 37).

### Fossil Record

Denmark, postglacial (HNR 1933, p. 128).

#### *\*Bembidion (Ocys) quinquestriatum* Gyll.

##### Distribution

(maps in NET 1923; BCH 1938, no. 39)

*Sweden:* Extremely rare and sporadic, without a continuous area; seems to have dwindled markedly in the last decades. Skå Lund (MCK 1835, p. 3), October 1893 (Roth, ML!); Landskrona, June 1896, 2 specimens (MLC, ML!); Hälsingborg (MCH, MG!), August 1887, June 1890, May 1894 (VNS, ML! HM!). Ramlösa (THS 1859, p. 208). Ble (certainly Karlskrona; ANK, VA!) Små Kalmar (several collectors!). Öld (WRG, RM!), Resmo-alvar, June 9, 1928 (LOH, det. JNS). Gtl Visby, 1928, 1940, (LTH); Burs, August 23, 1927 (LOH, det. JNS). Vgl (GYL, coll. THS, ML!), Göteborg (several collectors!), May 1898, in large numbers (SDN, MG!). Ögl (WBG, RM!), Stockholm (GLL 1896, p. 14; no voucher specimen). Upl Uppsala region, 1 specimen (WRN!).

*Norway:* Only a single specimen in the ESM collection, which was collected "probably near Oslo" (MST, N.E.T. 1922, p. 119; MO!). The record is in no way improbable, and the species has been included without reservations in the Catalogus (1939, p. 4) for Norway.

*Finland and Russian sector:* Absent.

270 *Adjacent regions:* In Denmark rare but rather widely distributed; not found on Bornholm (West 1940, p. 17). Estonia, Dorpat, 1938, 1 specimen (W. Harris, det. HAB). In Latvia, three localities (MIK 1905; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 335), also Ireland (JHS and HLB 1902, p. 581).

*Total area:* Western Palearctic species. In Europe predominantly a western species; *forma typica* distributed south as far as northern Spain (FUE 1919, p. 78; NET 1923) and southern Italy (LUI 1929, p. 67); east as far as Poland (LMN 1913, p. 55; NET l.c.) and Slovakia (ROU 1930, p. 128). In the Balkans and Transylvania, Asia Minor and Syria, and the Caucasus different subspecies occur (NET l.c.).

### Ecology

Within the region the species is markedly synanthropic. Only one individual

has been found which was not thus restricted, namely on the "Alvar† on Öld (see above), and possibly an accidental occurrence. Otherwise found in and around barns and older buildings, often in the city. Numerous observations from other regions likewise depict a markedly culture species ("Kulturart"). Found in particular on the walls of houses (SDT 1870, p. 412; E.M. 1901, p. 125; West 1940, p. 17; RSH 1842, p. 28; FRH 1897, p. 6; JNN 1905, p. 175; W.E.Z. 1917, p. 266; NBG 1929, p. 123; Rapp 1933, p. 54; HOR 1941, p. 163), in barns (RTT 1870, p. 17), and very frequently under bark of trees in gardens (Bach 1851, p. 92; EVS 1898, p. 61; S.E.Z. 1915, p. 211; NET and VOG 1916, pp. 62, 70; E.M.D. 1919, p. 163; DTZ 1937, p. 70; HOR 1937, p. 27, and 1941; E.B. 1938, p. 94; MEY 1943, p. 288; JEA 1941–1942, p. 449). The record for the seashore in England is probably accidental, as also in the tunnels of a species of Amphipoda (FWL 1887, p. 104; E.M.M. 1916, p. 90). It is quite possible that this species is associated with the nests and tunnels of rodents, as stated by West (1940, p. 17); however, the statement of LRS (1939, p. 374) that the actual records from mice burrows are from Denmark, might be due to a misunderstanding.

### Biology

In Sweden the species is found from May to August and in October. In Denmark, with rich material, distinct maximum abundance occurs in May (LRS 1939, p. 321). An immature beetle was collected on July 29 (Gtl), and two such beetles found in Germany on July 19 (E.B. 1938, p. 94). The species definitely hibernates as an adult; it has been found in winter months particularly in Germany (Rapp 1933, p. 54).

### Dynamics

Wings fully developed. Spontaneous flight observed many times in Central Europe (Bach 1851, p. 92; WHF 1881, p. 37; FRH 1897, p. 6; EVS 1898, p. 61).

\**Bembidion (Peryphus) repandum* J. Sahlb.  
(*fuscicrus* Motsch. p. p.)

### Distribution

*Russian sector:* Exclusively on seashores on the southern coast of the Kola Peninsula, six localities between Lm Umba and Lv Tetrina (SBJ 1873, p. 78; PPP 1905, p. 90; MH! MÅ! and other collections!).

Absent in the rest of Fennoscandia.

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



*Adjacent regions:* A very surprising record comes from Denmark: Jyll. Vejrs, at the sea, July 26, 1931, 1 specimen (E.M. 1937, p. 455; West 1940, p. 14). Not recorded in the other adjacent regions nor throughout Central Europe.

*Total area:* Both *repandum* as well as *fuscicrus* Motsch., *pictum* Fald., and other forms are, at best, to be considered subspecies of *obs curellum* Motsch. (NET 1935, p. 33). This species is almost circumpolar. In Europe (*repandum*) found outside the region only in the Kanin Peninsula (PPP 1909, p. 6) and Pechora region (SBJ 1898, p. 338). In Siberia several forms occur (among others, SBJ 1880, p. 18), east as far as Kamchatka (NET l.c.), south as far as western Turkestan, Mongolia, and Pamir (NET 1921, p. 203). North America, "*fuscicrus*" (MÜL 1918, p. 90; Leng 1920, p. 51; NET 1935). The relationships among the various forms have not been conclusively established to date.

### Ecology

At the White Sea found exclusively on quicksand (SBJ 1873, p. 79; PPP 1905, p. 90). The single Danish specimen was likewise collected on a quicksand seashore (West 1940, p. 14). Yet the species is certainly not halophilous, since it was found in Siberia, for example at the Ob River (SBJ 1880, p. 18) and the Lena River (PPP 1906b, p. 30). There are no records from the *reg. alp.* (including the tundra), but one specimen was found on the Kola Peninsula close to the timber line (PPP 1909, p. 6).

272

### Biology

Nothing is known about its cycle of development.

### Dynamics

Wings fully developed, and the insect has certainly flight capacity.

### *\*Bembidion (Paraprincipidium) ruficolle* Gyll.

#### Distribution (map by NET 1912)

*Sweden:* A great rarity. For a long time the only locality known was Små Skillingaryd at the Lagan River (BOH, according to GYL 1827, p. 401; 8 specimens, RM!), where the species was rediscovered by JNS, July 1939 and June 1942. Five other localities: Skå (AMM, 5 specimens, coll. GLL! exact locality not known), Äsperöd (THS, MB! NET 1912, map); Ilstorp (THS, MB!). Vrm: SDN showed me a specimen in 1923 which he had found dead on a sandy beach in Vrm during the summer of that same year, probably in the Gräsmark region; subsequently this specimen was not traceable in his

collection (MG). Dlr Transtrand, Höknäsheden, sandy bank of the Dalälvs River, June 20, 1939, 2 specimens (KLF!).

*Norway:* No records.

*Finland* (map in PME and PFF 1943, p. 190): Distribution very uneven and almost sporadic except in the southeast. In the province of Ik numerous localities (several collectors!), north as far as Pyhäjärvi (STN!). Other localities: Kl Salmis, two places, June 1938 (PFF, N.E. 1938, pp. 127, 128). Kb Liperi, seashore, June 1940, 2 specimens (PME). Ka Utti, July 11, 1940, 2 specimens (KRV!). Nl Hangö, June 16, 1922, 1 specimen (HLL); Tvärminne Skärgård, 1939, numerous in sea drift (PME 1944, p. 37!). Ab Lojo, May 25, 1922, 1 specimen (LBÅ); Yläne, June 1864, 2 specimens (SBJ 1873, p. 74; MH! coll. LBG!). Quite isolated in the north: Ob Kemijärvi, at the river, June 1936, 1 specimen (STN). Ks Paanajärvi, June 1939 (PFF 1943, p. 120); Salla, Kutsajoki, 1938 (KNG).

*Russian sector:* Only in the Swir region: Sv Segesanjoki, August 1942 (PME!), May 1943 (PFF); Uslanka, August 2, 1943 (PFF); Mjatusowa, June 18, 1875 (PPP 1899a, p. 9).

*Adjacent regions:* From Denmark only two old specimens available whose origin is not very clear (RYE 1906, p. 16; E.M. 1933, p. 361; West 1940, p. 13). According to SDL (1872, p. 41; 1891, p. 72) found in Latvia; there are no definite records from Estonia. Contrarily, recorded in Leningrad region (MAS 1902, p. xxxii; BSK 1908a, p. x1; 1909, p. 154), and also near Jamburg close to the Estonian border. Absent on the British Isles.

*Total area:* Palearctic species. In Europe markedly eastern species, but distributed (at least earlier) as far as western Germany (Hamburg, Rhineland) (HOR 1941, p. 123); not found in France. South as far as central Germany (Braunschweig and Dresden, old records; HOR l.c.), Galicia (NET 1912, LMN 1913, p. 54), Russia south as far as Dnjeppetrovsk (JAC 1905–1908, p. 281). Kirgizia (HEY 1880–1881, p. 52). Western Siberia (SBJ 1880, p. 15; NET 1912).

## Ecology

Stenotopic on flat, barren or just barely overgrown sand banks of rivers and lakes. In Sweden definitely known only from banks of rivers, which are likewise preferred in Finland (KRG, N.E. 1923, p. 122; PME and PFF 1943, p. 134); also found on shores of lakes (among others, SBJ 1873, p. 74). In northern Germany also on the seashore together with *pallidipenne* (S.E.Z. 1868, p. 48), possibly only accidental; also at puddles in sand pits (NET, E.B. 1912, p. 278). The sand is usually pure, rarely mixed with loam (PME and PFF l.c.). The insect lives immediately next to water and burrows in dull weather and at night (E.B. 1912, p. 278).

## Biology

The Fennoscandian catches known to me were made in May to September, with a distinct maximum abundance in June. Also in Braunschweig (E.B. 1912, p. 278) from May to September. Regarding the cycle of development, only a conjecture may be ventured that the species hibernates as an adult. Finnish entomologists hold the same view; according to them the species is unusually rare during midsummer.

## Dynamics

Wings fully developed. In Central Europe the species exhibits a strong tendency for flight during hot sunshine (E.B. 1912, p. 278; NET and VOG 1916, p. 64). In Finland 25 specimens collected in sea drift (PME 1944, p. 37).

274

*\*Bembidion (Peryphus) rupestre* L.  
(*bruxellense* Wesm.)

## Distribution

(map in LTH 1939a, p. 242)

*Sweden:* Distributed throughout the country, and very frequent almost everywhere. Surprisingly, only a single specimen, which possibly strayed in flight, has been recorded on Öld (Böda, July 1939, HNS, RM!); the species is also rare on Gtl and occurs only in the east; also less frequent in eastern Små. Rare in the actual fjeld regions.

*Norway:* Distributed throughout the country and very frequent except in the northernmost peninsulas (north of latitude 70° N) and the high fjelds. The gap between latitude 64° and 66° N is certainly due to insufficient investigation. Northernmost localities: 38 Alta, June 1924, 9 specimens (STE, MO!), Bossekop (several collectors; also E.T. 1900, p. 31); Lakselv in Porsanger (JEN, according to STA); 41 Grense-Jakobselv (MO!).

*Finland:* Universally distributed throughout the country except in the high fjelds.

*Russian sector:* On the Kola Peninsula only three localities in the west and two in the south (PPP 1905, p. 90; MH! Also Lv Kusomen, HLL, MH!). In Karelia certainly universally distributed; the gap between latitude 63° and 65° N is due to insufficient investigation.

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) and not rare (West 1940, p. 14). Estonia (several collectors!). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 339), also Ireland (JHS and HLB 1902, p. 585). Shetland (West 1930, p. 74). The Faeroes (West 1930, p. 12).

*Total area:* Palearctic species. In Europe (becoming rarer toward the south) south as far as central France (montane; DEV 1935, p. 25), northern



Italy (LUI 1929, p. 62), Transylvania (PTI 1912, p. 16). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308). Siberia (among others, SBJ 1880, p. 19), east as far as Lena (PPP 1906b, p. 30).

### Ecology

275 This species is the most eurytopic humidity-loving *Bembidion* species. It is absent or occurs only accidentally on completely barren banks. However, where the vegetation is not too high and thick, a diligent search on moderate to highly humid soil will not be futile. Principally on banks of every kind, especially along oligotrophic and dystrophic waters, but along distinctly eutrophic lakes lags in numbers behind other species of *Bembidion*; also at the sea (see LBÅ 1933, pp. 115 ff.). The species requires a more or less solid substratum and therefore is rare in live *Sphagnum*; contrarily, it is quite frequent at humid places in peat bogs; also found in pits; humid meadows, etc., where there is not open water during summer (see SPS 1910a, p. 73). It tolerates moderate shade. In northern Central Europe likewise markedly eurytopic (see GRD 1937, p. 40); farther south exhibits a distinct predilection for marshy regions (HOR 1937, p. 16; 1941, p. 138). In the fjelds rare already in the *reg. bet.*, but in Sweden found from Hjd to Tol; from the *reg. alp.* there is only one specimen, possibly accidental (Hjd Nean, 830 m above sea level, July 23, 1936, WRN!). Not known from the tundra region.

### Biology

Southern Swedish catches: III: 2; IV: 12; V: 59; VI: 151; VII: 56; VIII: 29; IX: 8; X: 3; XI: 2. In Denmark maximum abundance already in May (LRS 1939, p. 323). Very numerous immature beetles found from June 29 (Dlr) to August 15 (Sdm) and August 16 (Tol). In Denmark (l.c.) larvae occur in June and July. Spring breeder, hibernating as an adult. The beetle is carnivorous. Observed (LTH) on two occasions consuming a chironomid (Vgl Hjo, June 6, 1936; Vbt Umeå, July 10, 1936), and once an aphid (Nbt Harads, June 24, 1938).

### Dynamics

Wings fully developed. Spontaneous flight observed many times: Små Skillingaryd, June 3, 1936 (LTH); Nbt Över-Torneå, June 8, 1930 (LTH); NI Nurmijärvi (KNG); also in Germany (GRD 1937, p. 76). In Finland several specimens in sea drift (PME 1944, p. 37).



*\*Bembidion (Peryphus) saxatile* Gyll.

Distribution

(map by NET and MEY, E.B. 1934)

*Sweden:* Widely distributed throughout southern and central Sweden, but rather uneven in distribution due to its special life requirements (see below); more frequent in the west, missing on the southern coast of Skå. Southernmost 276 localities. Sk Malmö, July 1856 (THS, 3 specimens, MB!); Limhamn, July 21, 1929, 2 specimens (CDG!); Bjärred, June 23, 1941 (Palm); Ringsjön (several collectors!); Äsperöd (POR, LJ!). Northernmost localities of the continuous area: Jtl Jorm, two localities, June 1932 (JNS and Palm, E.T. 1936, p. 184); Åsl Vilhelmina, July 21, 1936, 2 specimens (LTH); Ång Tåsjö, July 1939, 5 specimens (BRC, RM!); Långsele, June 5, 1930, 1 specimen (LTH and Palm 1934, p. 35!); Österåsen, September 17, 1940, 7 specimens (BRD!). The species seems to be missing in Vbt, and an actual gap might exist here, while it occurs again farther north: Nbt Älvsbyn (LTH and Palm, l.c.!); Harads and Edeforsen, June 1938, several specimens (LTH); Över-Kalix and Vitsaniemi (LTH and Palm, l.c.!); Tärendö, July 29, 1938, 3 specimens (LTH); Lul Mäntyvaara, July 30, 1938, numerous (LTH).

*Norway:* Not found in the extreme north (including southern Varanger). Otherwise distributed widely and certainly continuously throughout the country, occurring on the coast as well as in the inland. The gap north of latitude 64° N is certainly not real. Northernmost localities: 35 Tromsö and 36 Mester-vik in Malangen (SPS 1888–1889, p. 104); 39 Karasjok (MST, MO!).

Doubtful: 37 Hammerfest (NET 1934).

*Finland:* Very unevenly distributed. I. In the coastal region of the south (including Åland and islands in the Gulf of Finland), frequent and distributed without gaps, becoming rarer toward the north, so that between the latitudes of about 62° and 66° N a "zone of extinction" emerges, with only the following localities known: Oa Norrskär, 1940 (LBÅ); St Kihniö, 1 specimen (GBL!); Sb Kuopio, 1 specimen (WLL!); Kb Kontiolahti, 1942, 1 specimen (LBG!); Ok Kajana (NDM, 1 specimen MH!). II. Four localities near the Arctic Circle: Ks Kuusamo, three localities (several collectors!); Ob Rovaniemi (KNG). III. Eight localities in the high north (Li, Lp), north as far as Li Tenojoki (PPP, FA!); Lp Ylaluostari (several collectors!).

*Russian sector:* Two localities on the southern coast of the Kola Peninsula (PPP 1905, p. 90; MH!). In Karelia near Kc Soroka (PPP 1899a, p. 10; MH!) and four localities in the Swir region, 1943 (PFF).

*Adjacent regions:* In Denmark exclusively at the sea, widely distributed (including Bornholm) but rather rare (West 1940, p. 15). On the coasts of Estonia (including Dago), frequent (several collectors!); two localities in the inland (HAB in litt.). In Latvia several localities (MIK 1905; LCK and MIK 1939; LCK in litt.). In Lithuania near Kowno (HEY 1903). Leningrad region

(OBT 1876). British Isles (Joy 1932, p. 339), also Ireland (JHS and HLB 1902, p. 585).

277 *Total area*: Palearctic species. In Europe predominantly northern; north-east as far as Mezen (PPP 1908, p. 5). In Central Europe almost exclusively on the coast, south as far as northern France (DEV 1935, p. 25). In the inland quite isolated; found in Bavaria, lake Chiemsee (MEY, E.B. 1937, p. 287; HOR 1941, p. 141); subspecies *devillei* Net. in the Alps on the border between France and Italy (NET and MEY 1934); finally in Crimea (NET and MEY, l.c.; MW!). The record from the Pyrenees (FUE 1919, p. 68) has not been included by NET and MEY (l.c.). The Caucasus (CHD 1846, p. 202; NET and MEY l.c.). The occurrence of true *saxatile* in the rest of Asia still remains uncertain. It has been recorded from Kirgizia (HEY 1880–1881, p. 50) and western Siberia (SBJ 1880, p. 18); of the six specimens from SBJ in the RM collection, only one (Omsk, Stousov!) belongs to the *saxatile* group, but is separable at least as a subspecies. In MW I saw one specimen from Tien Shan, which looked typical. According to NET (1930) the species is distributed east as far as Kurile Islands, and represented by various subspecies.

### Ecology

The species is stenotopic, living at lakes, rivers, or the seashore, on barren substratum consisting of coarse gravel and broken stone (see for example, SPS 1910a, p. 73). A predilection for the seashore can in no way be authenticated in Central Europe, and the inclusion of this species under “halophilous” Coleoptera (LNG 1929, p. 47), or even “halobionts” (HOR 1935, p. 28) is the result of ignorance (also see LBÅ 1931, p. 150). Its absence from markedly eutrophic waters is not due to the effect of the water but the absence of suitable shore material (see “Dynamics” below). Occurrence on loamy shores (KRG, N.E. 1923, p. 122; LBÅ 1933, p. 115) certainly only accidental. The species only reaches the fjeld regions on occasion (i.e., northern Dlr and Jtl), and does not cross the coniferous timber line. It is highly hygrophilous and lives immediately next to water. Always in open situations. In the southern Baltic Sea region (including Denmark; West 1940, p. 15) and the North Sea region exclusively at the sea; in eastern Prussia strangely on loamy precipices at a considerable distance from water. Additionally, in Bavaria near lake Chiemsee and hence along completely fresh water. The so-called “halophily” of the species in northern and western Central Europe is probably due to microclimatic factors (as emphasized by LBÅ 1931, p. 150). The assumed dependence on limestone (BUR 1939, p. 88; HOR 1941, p. 141; MEY 1943, p. 283) is not supported in the least by the Fennoscandian distribution (also compare PME and PFF 1943, p. 138).

Southern Swedish catches: IV: 10; V: 16; VI: 43; VII: 41; VIII: 11; IX: 5; X: 3. In Denmark maximum abundance in July (LRS 1939, p. 323). Numerous immature beetles from June 30 (Dsl) to August 13 (Ögl). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight capacity has not been demonstrated to date but is definitely present. As evidence, the occurrence of 15 specimens in sea drift in Finland may be mentioned (PME 1944, p. 37). There is also the following observation: The little city of Arboga in Vst is situated at a small loamy (highly eutrophic) river, the banks of which are consequently totally unsuitable for *saxatile*. Around 1930 however, a bridge was built across the river and coarse gravel brought in to line the southern bank up to the water mark. An investigation on June 17, 1936 revealed that *saxatile* was already established there in numbers. It could only have reached Arboga by flying.

### Variation

In its northern area in Europe the species is homogeneous except for inconsequential color aberrations. Furthermore the specimens from Bavaria, Crimea, and the Caucasus show little diversity (NET 1930; NET and MEY 1934). It is still not established whether *fuscomaculatum* Motsch. and other Asiatic forms (see NET 1930; LTH 1939–1940, p. 84, footnote) can actually be considered specifically identical with *saxatile*.

### *Bembidion (Daniela) scandicum* Lindr.

(E.T. 1943, p. 4; *macropterum* Munst. nec J. Sahlb.)

### Distribution

*Sweden*: Found exclusively in Tol, in the Abisko region, where SLL collected 4 specimens (June 31 [sic], July 21, 1918; August 12, 1919) but unfortunately gave no further locality data. On July 26, 1942, LDN (!) rediscovered one specimen in a barren gravel bank of the Torneträsk just west of the mouth of the Abiskojokk.

*Norway*: 39 Karasjok, on the Gorzzejok at high water, July 1907, 3 specimens (MST, N.E.T. 1932, p. 81; MO and coll. STA!).

Absent in eastern Fennoscandia.

279 *Total area*: There are no further records of the species. At present it is the only known endemic species of the Fennoscandian carabid fauna, aside from *Bradycellus ponderosus* known from a single specimen.



## Ecology

Nothing is known about the mode of life and cycle of development of the species. It may be assumed that its occurrence on the banks of the Torneträsk and Gorzzejok is secondary, probably completely accidental, and its true habitat is still not known.

## Dynamics

Wings fully developed. The specimens found on the bank of the Torneträsk had probably strayed in flight.

*\*Bembidion (Semicampa) schüppeli* Dej.  
(*sahlbergi* Zett. nec Dej.)

Distribution  
(map by NET and MEY 1938)

*Sweden*: I. In the Bothnian coastland continuously distributed. Delimiting localities: Nbt Pajala, Anttis, bank of the Torneälv, July 28, 1938, 4 specimens (LTH); Över-Kalix, 1 specimen; Älvsbyn, several specimens (LTH and Palm 1934, p. 36!); Vbt Byske, July 15, 1936, 3 specimens (LTH); Hällnäs, bank of river, July 18, 1936, 7 specimens (LTH); Umeå, bank of river, July 10, 1936, 1 specimen (LTH); Ång Undrom, June 1939, 6 specimens (BRC, RM!); Mdp delta of the Indalsälven, June 1937, 10 specimens (BRC, RM!). II. In Lapland, an isolated locality: Lyl Gaskelout on the Storuman, July 6, 1832 (ZTT 1840, p. 27; 2 specimens, ML!). III. Several localities on the lower reaches of the Klarälven in Vrm between Karlstad and Sälje, June 1933 (Palm and LTH 1937, p. 118!).

Doubtful: Dlr (GLL 1896, p. 13; no voucher specimen).

Erroneous: Nke, Örebro region (JNS, E.T. 1915, p. 203; 1918, p. 25; = *transparens*). Nke Hammar and Hls (WNG, E.T. 1880, p. 192; = *unicolor*, KF!).

*Norway*: I. Between latitude 63° and 70° N, chiefly in the coastal region, continuously distributed. Delimiting localities: 27 Stören and Trondheim (N.E.T. 1937, p. 145); 28 Stjördal and Snåsa (l.c.); Tynes in Verdal (ZTT, ML!). 280 35 Lanes (SPS, according to STA); 38 Kåfjord and Bossekop in Alta (MST, MO! STA). II. In the central south one isolated locality: 13 Gausdal, 1893, 3 specimens (ELG, det. MST).

*Finland* (map in PME and PFF 1943, p. 176). A highly split area. Enumeration of all the localities necessary: Nl Tvärminne skärgård, 1939, 5 specimens in sea drift (PME 1944, p. 37!), also in the mainland of Hangö-udd, Tenala parish (PFF). Ka Hogland, 2 specimens (KRG!). Ik Uusikirkko (N.E. 1934, p. 126; several collectors!). Kl Salmis, 1938, 2 specimens (PFF, N.E. 1938,



pp. 125, 127!). Kb Liperi, June 1940, 1 specimen (PME); Juuka, Halivaara, June 1940, 2 specimens (KRG!). Om Siikajoki (WUO, MÅ!). Ob Uleåborg and Hailuoto (WUO, MH!). Ks Paanajärvi, July 15, 1935 (KRG!). Lk Kittilä (KRG! SAA, MH!); Muonio (LFG, coll. SAR). Li, two localities on Lake Enare (PPP 1905, p. 91; MH! MÅ!).

*Russian sector:* Kola Peninsula, three localities in the south, on the White Sea: Lm Kantalaks and Umba (PPP 1905, p. 90); Kusräka (EDG, MH!). In Karelia near Kk Soukelo (SBJ 1873, p. 86) and three localities on the White Sea, south as far as Kr Suma (PPP 1899a, p. 11; MH!). Strangely not found to date in southern Karelia.

*Adjacent regions:* In Denmark only four localities in Jylland but in some cases found in large numbers (E.M. 1930, p. 445; West 1940, p. 15). In Estonia four localities on the northern coast and two on the mainland of the south (HAB in litt.); in Latvia apparently absent. Not known from Leningrad region, as far as I know. British Isles (Joy 1932, p. 341).

*Total area:* Palearctic species. In Europe boreo-montane, south as far as northeastern France (DEV 1935, p. 27) northern Italy (LUI 1929, p. 65), Transylvania (PTI 1912, p. 17), Moscow and Saratov (JAC 1905–1908, p. 290), Crimea (NET and MEY 1938). The records from the Pyrenees (FUE 1919, p. 74) are doubtful according to DEV (l.c.), since they are not supported by any voucher specimens. In the northeast as far as Pechora (SBJ 1898, p. 338). Asia Minor and the Caucasus (NET and MEY 1938). Siberia (among others, MKL 1881, p. 21; PPP 1907d, p. 7), east as far as Lena (PPP 1906b, p. 34). Northern Mongolia (PPP 1907d).

### Ecology

Exclusively a riparian species. In our region occurs predominantly at the larger rivers as well as at the sea (among others, SBJ 1873, p. 86; SPS 1910a, pp. 73–74), less often at lakes (N.E.T. 1932, p. 26; SBJ l.c.; PPP 1905, p. 91); in Karelia, a stenotopic riparian species (PME and PFF 1943, p. 139). Always  
 281 on humid sand with a marked admixture of loam (frequently as a muddy layer at the surface), and a fairly rich vegetation of *Carex*, grasses, and similar plants and often fine sparse moss as well. Usually shaded with *Salix* shrubs, *Alnus incana*, and other deciduous trees. Also on the British Isles at rivers (FWL 1887, p. 109). In Central Europe contrarily, predominantly a forest species living at shaded ponds and puddles (HOR 1941, p. 151; MEY 1943, p. 286). Absent in the *reg. alp.* and the tundra region.

### Biology

Swedish catches have been made in June and July except for one record in September. In Denmark predominantly May and June (LRS 1939, p. 324). In

Thuringia appears already in March (Rapp 1933, p. 48). It may hibernate as an adult, as suggested by LRS (l.c., p. 381).

### Dynamics

Exhibits wing dimorphism. All specimens examined from Scandinavia, as well as most of those from Finland, brachypterous; wings reduced to small, narrow scales. Contrarily, the specimens collected in sea drift near NI Tvärminne by PME (1944, p. 37) are all macropterous, with fully developed wings, and certainly capable of flight. Three specimens collected from the Baltic Sea dunes in Pomerania (D.E.Z. 1914, p. 397; S.E.Z. 1915, p. 211) were probably likewise drift material.

*\*Bembidion (Notaphus) semipunctatum* Donovan.  
(*adustum* Schaum)

### Distribution

*Sweden*: Two restricted and widely separated areas, the southern of which is perhaps only a more or less accidental occurrence. I. Skå (MLF, 1 specimen, RM! MLC, 4 specimens, MG!). Malmö, May 1883, 1 specimen (VNS, ML!), April 1887, 3 specimens (MLC, ML!); Bosjökloster, bank of Ringsjön, 1874, 1 specimen (THS 1869–1895, p. 535; MB!). II. Vrm (the record of "*ustulatum*" by THS 1859, p. 201, certainly belongs here), frequent along the Klarälven between Karlstad and Vingång, June 1933 (Palm and LTH 1937, p. 117!). Dlr (FHR, 1 specimen VA!), along the Dalälven: Folkärna, Brunnbäck, June 30, 1933, 1 specimen (KLF!); Hedemora, 3 specimens (RGS, E.T. 1913, p. 232, as "*varium*"!); Gustafs, Solvarbo, June 4, 1936, June 13, September 12, 1937, April 24, 1938, several specimens (KLF!); Stora-Tuna, Gimsberke, June 23, 1931, 3 specimens, August 29, 1932, 7 specimens (KHG!).

282 *Norway*: In the eastern half of the south rather widely and possibly continuously distributed along large rivers right into the Trondheim region. Delimiting localities: 3 Larvik, June 8, 1912 (NTV 1916, p. 18; MO!); 2 Hokksund and Ringerike; 10 between Kongsvinger and Åmot (HLS 1891a, p. 9); 13 Vestre-Gausdal (MST); Sel (HSS), July 5, 1933 (LTH); Folldal (HSS); 27 Melhus and 28 Hell in Stjördal (N.F.T. 1937, p. 145); 30 Grong (LYS).

*Finland* (map in PME and PFF 1943, p. 190): First discovered in 1923 (KRG 1925a, p. 12; N.E. 1923, p. 122). I. In Ik province several localities in the south, locally frequent (several collectors!), also near Metsäpirtti on the eastern side (several collectors!). KI Salmis, 1938, several specimens (PFF, N.E. 1938, pp. 125, 127). II. Quite isolated near NI Tvärminne 1939, numerous specimens in sea drift (PME 1944, p. 37!).

*Russian sector:* Only two localities in the extreme south (Sv): Gorki (SBJ 1894, p. 64; PPP 1899a, p. 10); Aunus city, July 1942, 1 specimen (KNG!).

*Adjacent regions:* In Denmark found only on the seashore near Rønne on Bornholm (West 1940, p. 13), probably accidental occurrence. Doubtful from Estonia; SDL (1891, p. 68) writes that it is "frequent with us" and mentions Livonia (but it is not clear whether found on the Estonian side). Latvia, in Kurland (SDL 1872) as well as in the east (ULN 1884). In Lithuania near Kowno (HEY 1903). Leningrad region (MAS 1903); also near Lempaala, 1943 (PHJ in litt.). British Isles, only England (Joy 1932, p. 338).

*Total area:* Palearctic species. In Europe south as far as the Pyrenees and the Balearic Islands (FUE 1919, p. 64), northern Italy (LUI 1929, p. 60), European part of Turkey (APF 1904, p. 86). In the northeast as far as Arkhangel'sk (HLL!) and Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308). Northern Africa (BED 1895–1914, p. 64). The Caucasus (JAC 1905–1908, p. 282). Turkmenia (JAC l.c.). Western Turkestan (HEY 1896, p. 9). Siberia (among others, SBJ 1880, p. 15; RM!), east as far as Lena (PPP 1906b, p. 28) and Amur (HEY 1893, p. 15). Northern Mongolia (PPP 1907d, p. 6).

### Ecology

A stenotopic riparian species in Skå in our region, except for possibly more or less accidental solitary records. On moderately humid fine sand with a distinct muddy (humus) layer on the surface and sparse, short vegetation of *Carex*, *Equisetum*, *Ranunculus reptans*, and similar plants, usually underlaid  
283 with very fine moss. Especially on terraces just above the normal high-water mark. Regularly together with *litorale* (also observed in England; E.M.M. 1911, p. 271), as well as *Bledius opacus* Block, *subterraneus* Er., *longulus* Er., and other species (KRG 1925d, p. 12; Palm and LTH 1936, p. 13). In Central Europe the species is found regularly at stagnant, often very small bodies of water, for example forest swamps (WHF 1881, p. 41; HOR 1937, p. 11; GRD 1937, p. 40), even together with *dentellum* (NET and VOG 1916, p. 65). On the other hand in France and on the British Isles apparently found only on river banks (JEA 1941–1942, p. 456; FWL 1887, p. 120).

### Biology

Swedish catches have been made in April to September, most of them in June. In Thuringia mainly in spring (Rapp 1933, p. 38). Immature beetles August 10, 1930 (Ik) and September 12, 1937 (Dlr); according to BUR (1939, p. 88) reproduction takes place in May. Thus it certainly hibernates as an adult.



## Dynamics

Wings fully developed and the insect certainly capable of flight. However, flight observations absent. In Finland several specimens were found in sea drift (PME 1944, p. 37).

*\*Bembidion (Peryphus) siebkei* J. Müll.  
(*distinguendum* of Norwegian authors nec Du V.,  
*petrosum* Munst. nec Gebl.)

Distribution  
(map in LTH 1939a, p. 251)

*Sweden*: Only two localities. Vrm Fastnäs, bank of the Klarälven, June 9, 1933, 1 specimen (Palm and LTH 1937, p. 117; coll. LTH). Tol Abisko, bank of the Torneträsk at the mouth of Abiskojokk, July 8, 1939, 1 specimen (KRG, coll. LTH), July 26, 1942, 1 specimen (LDN!).

*Norway*: Widely distributed in southeastern Norway and the north. I. 10 Kongsvinger (N.E.T. 1920, p. 60); Roverud. 13 Sel (HSS). 24 Vågå; Sörem; Dovre; Dalholen and Krokhaug in Folldal. 20 Åndalsnes in Romsdal, June 1934 (MST). 27 Melhus (N.E.T. 1937, p. 145). II. 30 Fellingsfoss (LYS, according to STA). 31 Vefsn (STA). 32 Saltdal, two localities (several collectors). 36, many localities in Målselv (SPS 1910a, p. 72; N.E.T. 1932, p. 25!); Skibotn, July 30, 1924 (LBÅ!); Nordreisa (STE, several specimens, MB!). 38, several localities at the inner ends of the Alta and Porsanger Fjords (several collectors!). 40 Sirma in Tana (MST). 39 Karasjok, several localities (several collectors; among others, SPS 1910a, p. 72; HLL 1921a, p. 32).

*Finland*: Only four localities in the north. Ks Paanajärvi, July 8, 1935, 1 specimen (KRG, N.E. 1935, p. 119!). Li Ivalojoiki, Kyrö, August 19, 1894 (PPP 1905, p. 90, "*andreae*"; according to HLL, N.E. 1934, p. 54); Inarjoki (SAA, according to HLL 1921a, p. 33; MH!); Tenojoki (PPP, MH!).

*Russian sector*: No records.

*Total area*: Palearctic species (or subspecies of *petrosum* Gebl., see below). Outside the region, known to date only from western Siberia, Yenisey region (LTH 1939–1940, p. 84).

## Ecology

Exclusive riparian species; in our region associated almost exclusively with large rivers. The records at lakesides (for example on the Torneträsk), at least in most cases, are accidental. Lives on humid fine sand, usually with a marked surface layer of mud (humus) and weakly developed vegetation; in northern Norway occurs together with *lapponicum* (SPS 1910a, p. 72; N.E.T. 1932, p. 26; STA in litt.).



## Biology

Nothing is known about the cycle of development.

## Dynamics

Wings fully developed and certainly functional. However, flight observations absent, except for the fact that the specimens found in Tol Torneträsk certainly strayed in flight.

## Systematics

*B. siebkei* might at best be considered a subspecies of *petrosus* Gebl. from Siberia (LTH 1939–1940, pp. 83 ff.). The *distinguendum* Du V. from the Pyrenees, Alps, and Carpathian mountains, and from the Caucasus is also very closely related (see also NET 1942–1943, p. 117).

\**Bembidion (Peryphus) stephensi* Crotch.  
(affine Steph., *heterocerum* Thoms.)

Distribution  
(map by NET and MEY, E.B. 1936)

Sweden: In western Skå, several localities: Fågelsång (east of Lund) (THS 1868, p. 291; MB!), June 1870, July (Roth, HM! MU!), May 1876 (VNS, MU!); Stehag, May 1882, July 1883, May, June, /1884 (MLC, Roth; several collectors!); Ignaberga, May 10, 1942, 1 specimen (BRK, ML!); Ven, 1934, numerous (Palm 1935, p. 8!); Landskrona, Glumslövs-backar, July 1, 1937, 2 specimens (BRD, coll. LTH); Hälsingborg region, three localities (THS 1868, p. 291; also other collectors!). In recent times found in the Göteborg region near Vgl Lerje, May 22, 1929, 2 specimens (ARV!), May 16, 1936, 2 specimens (LTH).

Norway: Only near Oslo, two localities: Bygdøy, May 4, 1929, 1 specimen (STA, N.E.T. 1932, p. 97), May 18, 1932, 1 specimen (MST, N.E.T. 1932, p. 82); Bogstadvatn, in a garden, May 25, September 3, 1937, May 17, 1938, May 25, 1941 (STA).

Finland: Only one locality: Ka Jääski, 1934, 1 specimen (SUD, N.E. 1934, p. 121; MH!), June and July 1937, numerous specimens on a brook bank (KNG, S.H.A. 1937, p. 156!).

Russian sector: No records.

Adjacent regions: In Denmark rather rare but quite widely distributed (also on Bornholm); seems to be absent in western and northern Jylland (West 1940, p. 14). In Estonia only near Reval, May 13, 1935, 2 specimens (MKK, coll. CRP and LTH). Latvia, Meldzere, May 29, 1938, 1 specimen (LCK and MIK 1939, p. 51). Not known from Leningrad region. British Isles (Joy 1932, p. 342),

also Ireland (JHS and HLB 1902, p. 584).

*Total area:* Solely European species (possibly also in the Caucasus). South as far as northern Spain<sup>17a</sup> (FUE 1919, p. 69), southern France (DEV 1935, p. 26), northern Italy<sup>17b</sup> (LUI 1929, p. 62). Bosnia (APF 1904, p. 99), Bulgaria (NET and MEY 1936), Slovakia (ROU 1930, p. 121), Rumania (PTI 1922, p. 16; NET and MEY 1936), according to JAC (1905–1908, p. 286) near Moscow.<sup>17a–c</sup> The Caucasus? (NET 1921, p. 200, subspecies *lirykense* Reitt., “spec. propria?”).

### Ecology

On humid, highly loamy, fine-grained sandy precipices in shady situations; in sand pits, at brooks, or at the sea. The species lives only where spring water oozes out, on quite barren places or those sparsely overgrown with *Tussilago*, *Equisetum*, and similar plants, usually with a steep gradient and with soft, loose soil in which the carabids hide during the day. Sometimes found in the company of *nitidulum*, but usually in more shaded situations. The single Finnish locality, on the bank of a forest brook, has been described in detail by KNG  
286 (S.H.A. 1937, p. 156) and illustrated with photographs. The insect lives here in tunnels of *Lumbricus*; successive species: *Stenus fossulatus* Er. Considerable literature on the ecology of this species published in Central Europe (for instance, West 1940, p. 14; K.R. 1912, p. 42; 1926, p. 208; E.M.D. 1916, p. 158; NET and VOG 1916, p. 66; E.B. 1917, p. 233; 1937, p. 379; W.E.Z. 1927, p. 4; HEB and MEX 1933, p. 68; GRD 1937, p. 40; HOR 1941, p. 135). Its dependence on loam has always been emphasized; the descriptions of its biotope moreover completely accord with our experience. I cannot decide whether the species really prefers limestone (LRS 1939, p. 378) or not.

### Biology

The Fennoscandian catches are distributed as follows: V: 12; VI: 4; VII: 2; VIII: 1; IX: 2. The rich material from Denmark shows a maximum abundance in May–June (LRS 1939, p. 322). Immature beetles, July 1 (Skå), in Denmark from June to August (l.c.). Spring breeder, hibernating as an adult. In captivity feeds on dead flies and small carabids; also cannibalistic (NET, E.B. 1921, p. 140).

### Dynamics

Wings fully developed. Spontaneous flight observed near Oslo, May 28, 1941 (STA).

<sup>17a–c</sup>Not included by NET and MEY 1936.

## Fossil record

Denmark, northern Jylland, postglacial (HNR 1933, p. 127, "*ruficorne*"; correction of name by West in litt.).

*\*Bembidion (Bracteon) striatum* Fbr.

## Distribution

*Finland*: First discovered in 1939 from 2 specimens collected in sea drift near Nl Ekenäs, Klovaskär, June 12 (PME, S.H.A. 1939, p. 218; PME 1944, p. 37!).

*Russian sector*: Only two localities: Swir River, June 16, 1869 (SBJ 1873, p. 74); just north of the mouth of Swir, 1942, 1 specimen (KRH, N.E. 1943, p. 163!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark only one specimen collected on the seashore near Ulfshale in Møen, May 18, 1932, and certainly accidental (E.M. 1933, p. 361; West 1940, p. 12). Estonia (SDL 1891; HAB in litt.); Latvia (SDL 1872; LBÅ 1932); also in Lithuania, near Njemen (KNG). No records from Leningrad region as far as I know.

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 59), central Italy (LUI 1929, p. 58), Serbia (APF 1904, p. 81). Asia Minor (NET 1921, p. 183). The Caucasus (CHD 1846, p. 198; SDR and LDR 1878, p. 85). Kirgizia (HEY 1880–1881, p. 52). Siberia (among others, SBJ 1880, p. 52; RM!), east as far as Lena (PPP 1906b, p. 26) and Amur (HEY l.c.); according to NET (1940, p. 158) only as far as central Siberia.

## Ecology

In Central Europe a nearly stenotopic riparian species occurring especially at the large rivers. Like species of *Chrysobracteon*, it sometimes lives together with *velox* or *litorale* (HOR 1937, p. 7), on sandy, barren banks (among others, WHF 1881, p. 42; Dahl 1928, p. 56; GRD 1937, pp. 40, 68; MEY 1943, p. 273). An insect of the plains (HEB and MEX 1933, p. 64; HOR 1941, p. 114). According to BUR (1939, p. 89) also found at the sea and lake-sides.

## Biology

In Central Europe the species seems to occur predominantly in early summer (Rapp 1933, p. 35; BUR 1939, p. 89). It is possible that like species of *Chrysobracteon* it hibernates as an adult.

## Dynamics

Wings fully developed, and the insect flies as actively as *velox* (BRS 1879, p. 61; HOR 1937, p. 7).

\**Bembidion (Daniela) tibiale* Dft.Distribution  
(map by NET 1912)

*Norway*: Only from four localities in 6 Ryfylke (HLS 1915, p. 17!) but sometimes frequent: Nedstrand, Sandsgårdsbekken; Marvik on the Sandfjord; Sandselven in Suldal; Hylskaret (JEN).

Erroneous: "Telemarken" (NET 1925, p. 52; confusion of provinces).

Absent in the rest of Fennoscandia.

288 *Adjacent regions*: Neither found in Denmark nor the entire region of the Baltic Sea.<sup>18</sup> British Isles, including Scotland (Joy 1932, p. 341), also Ireland (JHS and HLB 1902, p. 583).

*Total area*: Western Palearctic species. In Europe distributed south as far as Portugal and Sierra Nevada (FUE 1919, p. 65), central Italy (LUI 1929, p. 61), Greece (APF 1904, p. 88). East as far as Transylvania (PTI 1912, p. 15). Asia Minor (APF l.c.; NET 1912). The Caucasus (CHD 1846, p. 204; SDR and LDR 1878, p. 85; NET 1912). The report from eastern Turkestan, Kashgar (Bates, according to HEY 1896, p. 10) has not been verified as far as I know.

## Ecology

Within the small Norwegian area, exclusively on stony, apparently barren banks of brooks (HLS 1915, p. 17). In Central Europe, "a riparian species and restricted to gravel banks of montane rivers and brooks" (HOR 1937, p. 13); on barren, shaded places in the immediate vicinity of water (also see K.R. 1912, p. 41; E.M.D. 1914, p. 51; NET 1925, p. 53; E.B. 1927, p. 158; 1935, p. 220; Dahl 1928, p. 74; MEY 1943, p. 278).

## Biology

In Thuringia from April to October (Rapp 1933, p. 40). I saw an immature beetle from Norway collected on July 15, 1934 (JEN, coll. LTH). The species certainly hibernates as an adult.

<sup>18</sup>The report from Kurland (ISH 1927, p. 18) is due to confusion with *monticola* (LCK and MIK 1939, p. 52). The record from eastern Latvia (ULN 1884, p. 15) requires clarification.



## Dynamics

Wings fully developed. Observations of flight recorded from other parts of Europe (BUR 1939, p. 90).

## Fossil Record?

Galicia, early glacial; doubtful identification (LMN 1894, p. 26).

\**Bembidion* (*Notaphus*, *Eupetedomus*) *tinctum* Zett.  
(*nigripes* Mnnh. nec Kirby; see E.T. 1944, p. 210)

## Distribution

Sweden: Exclusively a northern species that north of latitude 63° N “replaces”  
289 the closely related *dentellum*. Jtl (possibly Åre region; MRT, 2 specimens, MG!). Ång Tåsjö, July 1939 (BRC, RM!); Hoting, July 25, 1936, 2 specimens (LTH). Åsl Åsele, July 24, 1936, numerous (LTH); Stalon, July 22, 1936, 1 specimen (LTH). Vbt Vindeln, June 22, 1930 (LTH and Palm 1934, p. 35; MG!). In Nbt numerous localities between Älvsbyn and Över-Torneå, 1930 (LTH and Palm, l.c.). Lul Pålkem, 1941 (WRN). Tol (“Lapp. bor.”: WBG, RM!), Karesuando, June 1935, 1 specimen (BRC, RM!).

Norway: Absent.

Finland: Due to the earlier confusion with *dentellum* and the present impossibility of obtaining the entire material for re-examination, the distribution, and especially the southern limit, has still not been determined. All records of “*dentellum*” north of the Arctic Circle can be readily referred to the present species. Farther south I have seen to date material only from the following localities: Ob Ylitornio (RNK, coll. STK!); Rovaniemi, June 12, 1905, 2 females (KRG; NET 1942–1943, pp. 47, 48!); Ks Paanajärvi (HLL! KNG!). Northernmost localities: Le Karesuando (HLL); Lk Muonio (ZTT 1828, p. 8; “loc. class.”; RNK and LFG, coll. STK!); Li Ivalo (RNK, coll. STK!), June 28, 1929, 3 specimens (LBÅ!).

Russian sector: Four localities in the west and south of the Kola Peninsula: Lt Nuortijärvi (PPP 1905, p. 89; MH); Lm Konosero (PPP l.c.; coll. LBG! also in the museums); Umba (PPP l.c., coll. LBG!); Lv Varsuga (KLM, MÅ).

Adjacent regions: Absent.

Total area: Circumpolar species. In Europe not found to date outside the region, but “*dentellum*” from the Pechora region (SBJ 1898, p. 338; PPP 1907c, p. 51) certainly belongs here. In Siberia probably widely distributed (NET 1942–1943, p. 48); I saw one male from Vorogova in the Ob region (SBJ 1880, p. 15; RM!). Alaska (Sitka; loc. class. of *nigripes* Mannh.).

## Ecology

The mode of life of the species seems to agree largely with those of *dentellum*. It thus lives on markedly muddy (with loam, gyttja)<sup>†</sup> banks of lakes and rivers. It requires soft, wet soil and some shade of bushes or ground vegetation. To differentiate *tinctum* from *dentellum* it suffices to emphasize that *tinctum* seems to prefer somewhat more open banks that are exposed to the sun but usually more richly overgrown with *Carex* and similar plants.

290

## Biology

The dated Fennoscandian catches were made during the three summer months, most of them in June (VI: 17; VII: 6; VIII: 1). Probably hibernates as an adult.

## Dynamics

Wings fully developed. Two individuals observed in spontaneous flight near Nbt Över-Torneå, June 8, 1930 (LTH).

*\*Bembidion (Diplocampa) transparens* Gebl.  
(*contaminatum* J. Sahlb.)

Distribution  
(map in LTH 1939a, p. 261)

*Sweden*: I. The principal area spreads across central Sweden and is rather broad, especially in the east. Delimiting localities: Vgl Vänersborg, Skräcklan, October 1943, 1 specimen (SVS!); Dagsnäs, 1939, 3 specimens (WRN!); Hjo, banks of Lake Vättern, 1936, 6 specimens (LTH); Ögl Tåkern, found many times at least since 1927 (Palm, LTH); Västra-Eneby, Åsunden, June 18, 1941, 1 specimen (LOH!); Linköping region, probably 1917, 70 specimens (SLL, RM! VA!); Örtomta, Svenneby, June 10, 1941, 1 specimen (LOH!). Vgl Otterbäcken, banks of Lake Vanern, 1936, 2 specimens (LTH); Vrm Ölme, banks of lake Vanern, 1936, numerous (LTH, WRN!); Skoghall, 1933, 2 specimens (Palm and LTH 1937, p. 118!); Upl Vendelsjön, 1941, 3 specimens (FIE!); Dannemora, 1936, 1 specimen (LTH); Gst Oster-Färnebo and Gysinge, on the Dalälven River, sometimes (for example, May 12, 1935) frequent (Palm! LTH); Storvik, June 1935, 1 specimen (JNS!); Mårdängssjön, May 30, 1937, 1 specimen (Palm!). II. Southern Sweden, solitary and probably always only accidental records: Skå Sandhammaren, seashore, June 1931, 1 specimen (Palm!); Ven, May 18, 1934, 1 specimen (Palm!). Hll Åskloster, 2 specimens (in any case before 1896; ERC, MG!). Vgl Göteborg, once (March 1911) several specimens on the bank of Göta-älv near Lerje, later looked for in vain (SDN, manuscript; several specimens, MG! ÅGR!). Gtl Fårön, Sudersand, June 12,

<sup>†</sup>(cf. page 69; suppl. scient. edit.).

1942, 2 specimens (BGW!), June 14, 1942, 1 specimen (BRT, ML!). III. Two localities (certainly naturalized) in Nbt: Luleå Karlsvik, bank of Lule-älv, June 18, 1938, 3 specimens (LTH); Persöfjärden, 1930, 4 dead specimens (LTH and Palm 1934, p. 36!). It is very peculiar that specimens of the species from Sweden are absent in most of the older collections. The oldest one is from Hill Åskloster (see above), and thereafter (as per reliably dated specimens) one from Uppsala from 1910 (LBL, RM!). In Nke found at least since 1915 (JNS).

291 *Norway*: Only in the north within two small regions. I. 33 Narvik, August 1927, 1 specimen (BRD, ML!); 35 Tromsdal (SPS 1888–1889, p. 104; 1889, p. 204; MO!); Ryöya (SPS, according to STA). II. Several localities in 41 southern Varanger near the Finnish border (several collectors; MO!).

Doubtful: 34 Melbo in Lofoten (LYS, Catalog MST; according to STA the species is not present in coll. LYS).

*Finland*: An extremely split distribution. I. In the south widely distributed; however, not found to date on the mainland between Helsinki (several collectors!) and Ka Viborg (BOM, MÅ!); on the other hand, found on the islands in the Gulf of Finland. Also on Al Kökar (HLL) and Idö (STK); first discovered in 1943 on Åland: Finström, Pålshöle (LBÅ). Northernmost localities of the southern area: St Norrmark (WKS, MH!); Ta Tammerfors region, several localities (several collectors!); Kb Liperi (PME!). II. Three localities in Ob on the Gulf of Bothnia (WUO 1910, p. 64; MH!). III. In the northeast: Ks Salla, three localities (KNG!); Lp, several localities in Petsamo (several collectors! LBÅ 1933, p. 118), southernmost near Patsjoki and Enare-träsk (PPP 1905, p. 91; FA!).

*Russian sector*: I. In the western and southern parts of Kola Peninsula several localities between Lt Tuulomajoki and Lv Varsuga (PPP 1905, p. 91; MH! MÅ!). II. Three localities in southernmost Karelia (Sv): Sermaks (PPP 1899a, p. 11); Gumbaritsa and Karelka, 1942, 1943 (PME! PFF!).

*Adjacent regions*: In Denmark found only on the western shore of Bornholm, certainly occurring only accidentally (West 1940, p. 16). Estonia, four localities on the northern coast (HAB); Latvia, two localities on the west coast of Kurland, seashore (LCK and MIK 1939). Leningrad region (BSK 1922).

*Total area*: Palearctic species. In Europe markedly northeastern species, west and south only as far as the German Baltic Sea coast (Rügen; LTH 1939–1940, p. 92; HOR 1941, p. 452). In the northeast in Kanin (PPP 1909, p. 6); in the rest of Russia, outside our region (except for Leningrad region), the species is surprisingly absent. Siberia (HEY 1880–1881, p. 48; SBJ 1880, p. 19; RM! PPP 1907d, p. 7), east as far as Lena (PPP 1906b, p. 34).

### Ecology

Exclusive riparian species, living in southern and central Sweden stenotopically on richly overgrown shores of eutrophic lakes, and hence on loamy soil.



292 Namely in thick *Phragmites* vegetation just next to the water line, often even in old dried *Phragmites* beds submerged in water, and then regularly together with *Odacantha* and *Agonum thoreyi*. Records on barren lakesides (for example, Vättern) or at the sea (Skå, Denmark, Germany) are, at least in the southern part of the area (see below), only accidental. Records on swampy banks of larger rivers are rare (Vgl, Gst, Nbt) but constant. Quite surprisingly the species occurs in the high north (Norway, Finland, Kola Peninsula?) as primarily a seashore inhabitant (SBJ 1873, p. 85; SPS 1888–1889, p. 105; 1889, p. 204; LBÅ 1933, p. 118); the species also occurs here on lakesides and river banks (PPP 1905, p. 91). Not found in the *reg. alp.* or in the tundra; however, one specimen found on the Kola Peninsula close to the timber line (PPP 1909, p. 6).

### Biology

Swedish catches: II: 1; III: 1; IV: 8; V: 16; VI: 26; VII: 2; VIII: 0; IX: 1; X: 5. Immature beetles occur in October (Ögl), but one specimen also found on May 16, 1939 (NI Nurmijärvi, KNG!). The insect hibernates normally as an adult and breeds in spring.

### Dynamics

Wing dimorphism evident (LTH 1939a, p. 261). In the brachypterous form the wings are considerably narrower than the elytron and do not attain its length; hence they are not functional. The macropterous form has fully developed wings; spontaneous flight was observed near NI Nurmijärvi (KNG). In Finland the species was found in large numbers in sea drift (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37). Records for the seashore of the southern Baltic Sea region (Skå, Gtl, Denmark, northern Germany) are likewise undoubtedly the results of anemochorous dispersal. The species in general shows a strong tendency to transmigrate into distant regions.

### Fossil Record?

A very closely related "species," *subcontaminatum* Lomn., from the early glacial deposits of Galicia (LMN 1894, p. 27).

\**Bembidion (Philochthus) unicolor* Chaud.  
(*mannerheimi* auct. nec C.R. Sahlb., *haemorrhous* Steph.)

### Distribution

293 *Sweden*: Continuously and quite uniformly distributed in southern and central Sweden, becoming rarer toward the north. Northern delimiting localities: Vrm



Gräsmark, 1923 (SDN, MG!); Dlr Leksand, 1936 (KLF!); Hls Los and Ljusdal (SJB); Jtl Revsund, May 29, 1941, 2 specimens (BGW!); Ragunda (FRI, 1 specimen, VA!); Ång Härnösand, July 7, 1936, 3 specimens (LTH).

*Norway:* Exclusively in the south and there distributed along the coast from the Swedish border as far as 7 Bergen, Stend (N.E.T. 1930, p. 338). In the southeast spreads to the inland, north as far as 15 Kongsberg; 3 Fiskum; 10 Kongsvinger.

*Finland:* Distributed throughout the southern and central parts, north as far as more than latitude 64° N. Northernmost localities: Om Oulainen (SDM, MH!); Haapavesi (HEL, NL); Ok Kajana (HLL, MH!); Sotkamo (PHJ!).

*Russian sector:* In southern Karelia, several localities (several collectors!), also near Kr Suma (PPP 1899a, p. 11; MH!), and Solovetsk Island (EDG, MÅ!).

Doubtful: Lt Kola (ENW, MK!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and, except for the western coast of Jylland, fairly frequent (West 1940, p. 18). Estonia (HAB in litt.); Latvia (LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 336), also Ireland (JHS and HLB 1902, p. 581). Shetland (West 1930, p. 74).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 76), northern Italy (LUI 1929, p. 68), Montenegro (APF 1904, p. 111). In the northeast as far as Mezen (PPP 1908, p. 5). The Caucasus (SDR and LDR 1878, p. 84; ECH 1930b, p. 215). Western Siberia (HEY 1880–1881, p. 48; SBJ 1880, p. 20; RM!).

## Ecology

Definitely a deciduous forest species, occurring in moss and foliage in humid shady places with a prominent layer of humus. Prefers to live under *Salix* shrubs, often but not always at pools or brooks. Ground vegetation usually poor. Especially characteristic of drier parts of *Alnus glutinosa* swamps; also in forest bogs, even in *Sphagnum* (RNK 1938, p. 65). Observations from Central Europe reveal the same mode of life (for example, D.E.Z. 1907, p. 154; NET and VOG 1916, p. 70; NBG 1929, p. 122; GRD 1937, p. 42; HOR 1937, p. 26); occurrence on bog soil possibly more frequent (ROU 1934, p. 76; HOR l.c.).

## Biology

Swedish catches: III: 4; IV: 8; V: 42; VI: 55; VII: 29; VIII: 17; IX: 27; X: 8; XI: 4; XII: 3. In Denmark maximum abundance already in April and again in October (LRS 1939, p. 325). Numerous immature beetles throughout the period from July 22 (Små) to September 18 (Vgl). Spring breeder, hibernating as an adult.

## Dynamics

Wings always reduced to a very small scale (LTH 1939–1940, p. 95). As a fairly eurytopic forest animal, the species nevertheless exhibits a fair dispersal capacity.

*\*Bembidion (Peryphus) ustulatum* L.  
(*andreae* Er. nec Fbr., *littorale* auct. nec Ol.)

## Distribution

*Sweden*: Especially frequent in Skå and on the western coast, becoming rarer and more sparsely distributed toward the north and east. Northernmost localities, which certainly do not form the boundary of a continuous area, are: Vrm Charlottenberg (SJB); Dlr Ornäs (SJB); Orsa, June 1908 (UYT 1909, p. 297, and in litt.); Upl Skutskär, 1936 (LTH); Hls Hudiksvall, loamy bank of Lillfjärden, numerous (SJB); Mdp Liden (ADZ, 1 specimen, LD!).

Erroneous: “Lappl.” (GLL 1896, p. 11; probably “*rupestre*” according to ZTT 1840, p. 25. See LTH 1938, p. 13).

*Norway*: Continuously distributed and usually frequent on the southern coast between the Swedish border and the Bergen region (SPS 1875, p. 19, “*andreae*”; 1901, p. 35, “*littorale*”); in the southeast north as far as 10 Hoff in Solör. Farther north only the following localities: 19 Laerdal in Sogn; 24 Vågå and Fokstua; 25 Røros. Finally in Trondheim (N.E.T. 1937, p. 145), June 1925 (LTH).

Doubtful: 32 Salten (SBJ, according to SPS 1888–1889, p. 103; in the Catalogus by MST question-marked. Possibly confused with *siebkei*).

*Finland*: Found only in the south, but continuously distributed and sometimes frequent. Except for Al Mariehamn (MER, 1 specimen, MÅ!) absent on all the islands. Northernmost localities: Oa Korsholm, Vestervik, 1920, 1 specimen (RDL!); Ta Ruovesi (SAR); Asikkala (KNG); Sa Villmanstrand (EHN, MÅ!); Kb Kitee and Liperi (PME!).

Doubtful: Lk Muonio (KLS and MKL, according to SBJ 1873, p. 78; MKL, MH! See *Acupalpus dorsalis*).

*Russian sector*: Five localities in southern Karelia (PPP 1899a, p. 10), north as far as Kn Petrosavodsk (several collectors!).

*Adjacent regions*: In Denmark very frequent all over (West 1940, p. 14). Estonia (several collectors! HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 340), also Ireland (JHS and HLB 1902, p. 586). Shetland (West 1930, p. 74).

*Total area*: Palearctic species (doubtful in North America; MÜL 1918, p. 93; LNG 1920, p. 51). In Europe south as far as southern Spain (FUE 1919, p. 67), southern Italy (LUI 1929, p. 62), Greece (OTZ 1886, p. 206). Northern Africa (JEA 1941–1942, p. 509). Asia Minor (NET 1921, p. 204; ECH 1922,

p. 31). The Caucasus (SDR and LDR 1878, p. 85; ROU, *Festschr. E. Strand*, V. 1939, p. 464). Kirgizia (HEY 1880–1881, p. 50). Western Turkestan (NET, K.R. 1934, p. 70). Western Siberia (HEY l.c.; PPP 1907d, p. 7).

### Ecology

On somewhat humid loamy soil, moderately shaded by tall ground vegetation (often *Tussilago*) or by shrubs and trees. Often on larger bodies of water but especially at smaller ones (ponds, puddles, brooks); prefers water contaminated with refuse and perhaps “nitrophilous”. Also at the sea. Additionally at built-up places, not associated with water, e.g., stables and other outhouses, even in the city, and in general favored by culture. In Central Europe the species seems to be predominantly ripicolous, and synanthropy has not been emphasized in literature; its dependence on loam, however, is just as pronounced as in our region (see LRS 1939, p. 379; Dahl 1928, p. 78; GRD 1937, p. 40; HOR 1937, p. 15; MEY 1943, p. 281).

### Biology

Swedish catches: I: 1; II: 2; III: 1; IV: 18; V: 35; VI: 53; VII: 26; VIII: 19; IX: 14; X: 5; XI: 2; XII: 2. Immature beetles, July 11 (Skå) and during August (Vgl). In Denmark larvae from end of June to September (LRS 1939, p. 323). Spring breeder hibernating as an adult.

### Dynamics

Wing dimorphism evident. The brachypterous form of course has a reflexed apical part but, in this case, posterior projection greater than usual; surface of entire wing only about as large as an elytron. The macropterous form (“*pseudoustulatum* J. Müll.”) has fully developed wings and has been observed in spontaneous flight in Mecklenburg (GRD in litt.). I have seen only one specimen of this form from our region: Skå Finja, August 13, 1936, river bank, recovered with five brachypterous specimens (LTH). It is more widely distributed in Central Europe.

\**Bembidion (Notaphus) varium* Ol.  
(*ustulatum* auct. nec L.)

### Distribution

*Sweden*: On Öld and Gtl widely distributed and not rare, likewise in Skå, where the northernmost localities are: Hälsingborg (MLC, HM!); Finja, 1936, 1 specimen (LTH); Åhus, 1938, 1 specimen (HZE!). In continuation with the foregoing: Hll (certainly Edenberga region, MRT, MG!); Ble Hällevik, 1936



(SJB); Små Kalmar (HGL, coll. JNS and LTH). Farther north three separate areas: I. Hll Särö, Gålboviken in Släp, and Vallda (several collectors and collections!); Vgl Göteborg region, several localities (several collectors and collections!). II. Ögl Omberg region, frequent especially on Lake Tåkern (Palm! LTH); Lönsås, Hyttringe, August 10, 1935 (LTH). III. Stockholm (BOH, RM! VYL, MU!); Upl Uppsala, Fyrisån, October 14, 1926, 1 specimen (FRL!).

Erroneous: Vrm (MLB, according to THS 1859, p. 201; certainly = *semipunctatum*). Dlr Hedemora (RGS, E.T. 1913, p. 232, = *semipunctatum*!).

Norway: Absent. Older records based on confusion with *semipunctatum* (MST, N.E.T. 1933, p. 270).

Finland: Only in the southwest, but found in numerous localities (including Åland) that form a continuous area. Delimiting localities: Ab Nystad (SDM, MH!); Ta Lempäälä (PTK, MÅ!); Padasjoki (EHN, according to SBJ 1883, p. 150; MH!); Nl Äggelby (KNG).

Russian sector: Absent.

Adjacent regions: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 13). In Estonia only on the western coast (Palm! HAB in litt.), including Ösel (HAB 1936a; LCK and MIK 1939); Latvia (ULN 1884; LCK in litt.). OBT (1876) mentions the species from Leningrad region, but this report is probably due to confusion with *semipunctatum*, since the latter species has been recorded by MAS (1903). British Isles (Joy 1932, p. 338), also Ireland (JHS and HLB 1902, p. 587).

Total area: Palearctic species. In Europe south as far as southern Spain and the Balearic Islands (FUE 1919, p. 63), Corsica (DEV 1935, p. 24), central Italy, Sardinia, Sicily (LUI 1929, p. 60), Greece (OTZ 1886, p. 205). Northern Africa (MÜL 1918, p. 60). Canary Islands (JEA 1941–1942, p. 456). Asia Minor (APF 1904, p. 85). Syria (JEA l.c.). The Caucasus (SDR and LDR 1878, p. 85; LSH 1936, p. 139). Western Turkestan (HEY 1896, p. 9). Siberia (among others, PPP 1907d, p. 6), east as far as Lena (PPP 1906b, p. 28), Amur and Kamchatka (HEY 1880–1881, p. 51; 1893, p. 15).

### Ecology

Exclusively on wet, soft loamy soil in open sun-exposed situations, at the sea as well as at stagnant waters, usually ponds and puddles that often dry up in summer. Less often along slow-flowing rivers. Vegetation usually rich only at some places, and consists of grasses (*Agrostis*, *Glyceria*, and similar plants), *Carex*, *Potentilla anserina*, etc. At the sea predominantly in marshy meadows. Regularly successive species: *Dyschirius lüdersi*. In Central Europe inhabits the same biotopes (see LRN 1936, p. 132; NET and VOG 1916, p. 65; GRD 1937, pp. 40, 68). Assumed halophily (BUR 1939, p. 90) erroneous (HOR 1941, p. 125).



## Biology

Swedish catches: IV: 1; V: 21; VI: 19; VII: 23; VIII: 11; IX: 4; X: 2. In Denmark also quite uniformly distributed during the summer months (LRS 1939, p. 322). Immature beetles from July 15 (Ab) to August 15 (Skå). Larvae in Denmark from June to the beginning of September (1.c.). Spring breeder, hibernating as an adult. In Germany observed spontaneously consuming a Collembola (GRD 1937, p. 28). Also known to feed on nematodes as well as larvae of *Ochthebius* and *Heterocerus* (LRN 1936, p. 132).

## Dynamics

Wings fully developed. Numerous flight observations: Skå Kungstorp, August 7, 1936 (LTH); Gtl Visby, May 1, 1940 (upon exposure to the sun under glass; LTH); also in Central Europe (HST, E.N. 1876, p. 79; CAI 1908, p. 49; SZM 1907, p. 122; NET in litt.). In Finland, three specimens found in sea drift (PME 1944, p. 37).

298

*\*Bembidion (Chrysobracteon) velox* L.  
(*impressum* Panz.)

## Distribution

(map by NET and MEY 1939)

*Sweden*: I. Along the middle and lower reaches of large rivers, continuously distributed from Vrm as far as the Finnish border. Highest localities: Vrm Långflon (Palm and LTH 1937, p. 117!); Dlr Lima, Tisjölandet, 1938, 1 specimen (TJB!); Orsa, 1908 (UYT 1909, p. 297, and in litt.); Hls Los (SJB); Jtl Revsund 1941 (BGW!); Åre, 1840 (ZTT, ML!), SDN, 8 specimens (MG!); Tännforsen, September 4, 1943 (BGW); Jorm, 1932, three localities (JNS and Palm, E.T. 1936, p. 184!); Ång Tåsjö (CDG, E.T. 1931, p. 163! BRC, RM!); Åsl Åsele, 1936, numerous (LTH); Lyl Lycksele (coll. TIM, LU!); Sorsele, two localities (GTZ, E.T. 1932, p. 47!); Pil Arvidsjaur, 1936, 4 specimens (RGS!); Nbt Edeforsen, 1938, 1 specimen (LTH); Över-Kalix and Over-Torneå, 1930 (LTH and Palm 1934, p. 34!); Tol Jukkasjärvi, July 3, frequent (ZTT 1828, p. 6). II. In southwestern and central Sweden, south as far as Hll Fjärås (several collectors!); Små, on the lower reaches of Lagan, 1907 (NST, coll. LTH); Bolmsta, 1936 (LTH); Skå Vittsjö, at least since 1866, numerous (several collectors! THS 1867a, p. 18; 1867b, p. 41); Köphult, 1921 (RNG, 2 specimens, ML!). Eastern limit of the area in southern and central Sweden represented by the following localities: Små Eksjö (WIB, ML!); Vg Hjo, bank of Vättern, 1936, 2 specimens (LTH); Nke Hasselfors, June 12, 1936, frequent (LTH); Vst Nora, 1936, 1 specimen (LTH); Dlr Horndal, Rossen, May 20, 1935, 1 specimen (Palm); Upl Skutskär, seashore, June 28, 1936, 1 specimen (LTH).

III. Isolated on GtI: Visby, 1930 (LNM!); Fårön, at least since 1904, frequent (several collectors! MJB 1905, p. 21; RM!); Sandön (JNS 1925, p. 67!).

Doubtful: Sdm (FHR, VA!). Stockholm (BOH, coll. AND, LF!). Upl (WRN, 7 specimens! "Uppsala region" according to WRN in litt.).

*Norway*: I. Eastern part of southern Norway, west as far as 6 Lutsi in Jæren and Ims in Høgsfjord (HLS 1915, p. 15); 15 Noresund (HLS); 24 Lom, June 1922 (MST); north as far as 25 Røros (MST, MO!); 27 Orkedal and 28 Snåsa (N.E.T. 1937, p. 145). Almost exclusively inland. II. In the high north, five to six localities: 36 Fjellfrøskvatn, numerous (SPS 1910a, p. 70; N.E.T. 1932, p. 25!); 38 Lakselv in Porsanger (JEN, according to STA); Skoganvarre (STA); 39 Karasjok (several collectors; MO!); 40 Seida in Tana (SOO, according to STA); also in 41 Varanger without exact locality (ESM).

299 Doubtful: 32 Saltdal (SBJ, according to SPS 1888–1889, p. 100; in coll. SBJ, MÅ, there is only *lapponicum* from Salten). 37 Hammerfest (STR, according to SPS 1899, p. 147; mix-up of localities probable; see *lampros*).

*Finland*: Distributed throughout the country without discernible gaps but markedly local. On Åland only near Hammarland (SAR). Northernmost near Li Utsjoki (KRG, coll. LBG!) and Lp Yläluostari (HLL!).

*Russian sector*: Three localities in the western part of the Kola Peninsula, east as far as Lb Hibina (PPP 1905, p. 88; MH!). Furthermore, near Kk Kunttijärvi (PPP l.c.; MH!). In southern Karelia, several localities (several collectors!), north as far as Kn Saoneskje-Shungu (PPP, MH!).

*Adjacent regions*: Not found in Denmark (West 1940; HOR 1941, p. 117; erroneous record by NET and MEY 1939). In Estonia, including Dagö, rather widely distributed (HAB in litt.); Latvia (ULN 1884; RHL 1921; LCK in litt.). Leningrad region (OBT 1876). Absent on the British Isles.

*Total area*: Palearctic species. In Europe south as far as central France (DEV 1935, p. 24), Austria (HOR 1941, p. 117), southern Poland (NET and MEY 1939).<sup>19</sup> Northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 307). Siberia (among others, SBJ 1880, p. 14; RM! NET and MEY 1939), east as far as Lena (PPP 1906b, p. 26), Amur and Kamchatka (HEY 1880–1881, p. 52; 1893, p. 14).

### Ecology

On banks of larger oligotrophic lakes and rivers on pure, sometimes fairly coarse sand which is completely barren; also on temporary sandy banks of rivers. At the Baltic Sea and the Gulf of Bothnia also on the seashore. The species lives in the immediate vicinity of water and in inclement weather hides

<sup>19</sup>The records from northern Italy (LUI 1929, p. 58) and Transylvania (PTI 1912, p. 14) were not included by NET and MEY (1939), and hence may be doubtful.

in sand or under organic debris washed ashore, etc. In Central Europe principally on river banks (HOR 1941, p. 116).

### Biology

Southern Swedish catches: IV: 1; V: 7; VI: 36; VII: 10; VIII: 2. Numerous immature beetles between July 17 (Gtl) and August 9 (Nbt). Without doubt a spring breeder, hibernating as an adult.

300

### Dynamics

Wings fully developed, and in warm sunny weather as active a flier as *Cicindela*. It is notable, however, that this species is completely missing in the extensive sea-drift material from Finland (Frey 1937; STÅ 1938; PME 1944).

### Variation

The darker colored aberration *güntheri* Seidl. (also in NET 1942–1943, p. 24), often considered a subspecies of *velox*, occurs especially in Jtl, but is also found here and there in the other northern and eastern parts of the region, together with the *forma typica* and intermediate variations. I still hold my earlier view (1939–1940, p. 67) that the subspecies' name should not be used here.

*\*Bembidion (Plataphus) virens* Gyll.  
(*pfeiffi* Dej.)

Distribution  
(map in LTH 1935b, p. 587)

*Sweden*: Predominantly a western species, reaching the east coast only in the Bothnian coastal region: Upl Grisslehamn, June 24, 1936, 3 specimens (LTH); Älvkarleby, Biludden, July 18, 1937, not rare (Palm!); Gst Norrsundet, July 1, 1936, 2 specimens (LTH); Hls Gnarp, 1 specimen (SJB!); Vbt Byske, July 15, 1936, 5 specimens (LTH); Nbt Luleå Skärgård, Sandskär, July 17, 1938, 1 specimen (LTH); Råneå, July 17, 1938, 3 specimens (LTH). Easternmost localities: Vrm Vingång, 1933 (Palm and LTH 1937, p. 117!); Hls Kårböle, Strandbodarna, 1942, 6 specimens (LBL, RM!); Delsbo (RUD, 1 specimen, MG!); Jtl Revsund, 1941, 3 specimens (BGW!); Ång Tåsjö, 1939, 13 specimens (BRC, RM!); Åsl Saxnås, Kultsjön, July 1, 1939, (NST, coll. LTH); Lyl Storuman (leg.?, coll. GLL!); Sorsele, Stora-Tjulträsk, June 19, June 22, 1932, 5 specimens (GTZ!); Lul Ullatti, Ängesån, July 30, 1938, frequent (LTH). Isolated in Boh: Ödsmål, July 1942, 1 specimen (HNS, RM!); Ljungskile, numerous (several collectors!); Uddevalla (GYL 1827, p. 407); Fjällbacka, June 1885, 2 specimens (Stenström, coll. Roth, ML!).



Doubtful: Vst (ANK, 2 specimens, VA!).

Erroneous: Vgl Göteborg (SDN, according to GLL 1896, p. 10). Stockholm (VYL, 2 specimens, MU! An occurrence in outer Skärgård of Stockholm would nevertheless be possible).

301 *Norway*: Distributed almost throughout the country except on the northernmost peninsulas. The gap on the west coast between latitude 61°30' N and 63°30' N is certainly due to insufficient investigation. Its absence in the greater part of the southeastern coast might, however, be actual. Northernmost localities: 38 Bossekop in Alta; Börselv and Lakselv in Porsanger (MST); 40 Polmak (SAA!).

*Finland*: In the highest north continuously distributed, south as far as Lk Muonio (RNK); Kittilä (SAA! KRG); Lp Lutto region (PPP 1905, p. 89; MH! PFF, N.E. 1938, p. 65). Farther south near Ks Paanajärvi (SBJ 1873, p. 76; several collectors!) and at two localities on the Bothnian Sea: Om Brahestad (WUO, MH! MÅ!); Lohtaja (WUO, MH!).

*Russian sector*: Only in the western and southern parts of Kola Peninsula (PPP 1905, p. 89; MH!), east as far as Lv Tschapoma (SBJ, MH!).

*Adjacent regions*: Neither found in Denmark nor the entire Baltic Sea region. British Isles, only one locality in Scotland (LTH 1935b).

*Total area*: Probably a palearctic species. In Europe, outside the region known definitely only from Scotland (see above). The record from Russia, Yaroslav (JAC 1905–1908, p. 282) is very doubtful. The records in literature give the impression of a continuous distribution, extending far into Siberia (SBJ 1880, p. 16; 1898, p. 338; MKL 1881, p. 21; JAC l.c.). However, I have not succeeded to date in finding a specimen of *virens* from regions east of the Kola Peninsula. All specimens proved to be *hasti*, *hyperboreaorum*, or *prasinum*. NET nevertheless informed me that in his collection there is an old *virens* female from Tobolsk (without collector's name). Hence it might not be correct to consider *virens* a "solely European" species.

### Ecology

On completely barren gravel or scree banks of lakes and rivers, as well as at the sea. The latter occurrence is primarily seen along the Gulf of Bothnia, in Boh as well as in northern Norway (N.E.T. 1932, p. 19), whereas in other parts of Norway the species is found almost exclusively on fresh waters (HLS 1891a, p. 9; SPS 1901, p. 35). The occurrence on a loamy river bank in Lp (LBÅ 1933, p. 115) was certainly only accidental. Not found in the *reg. alp.* since the record by PPP (1905, p. 17) could well be due to confusion with *hyperboreaorum*. The species is highly hygrophilous and lives right next to water. Successive species (in different parts of the region): *bipunctatum*, *prasinum*, and *saxatile* (the latter species also according to SPS 1910a, p. 73).

302



## Biology

Dated Scandinavian catches known to me can be divided as follows: V: 3; VI: 26; VII: 30; VIII: 2; IX: 2; X: 1. Numerous immature beetles from June 24 (Upl) until August 3 (Hjd). The species certainly hibernates as an adult.

## Dynamics

Wings fully developed. The species has certainly flight capacity but to date no corroborative observation available.

*\*Blethisa multipunctata L.*

## Distribution

*Sweden:* Distributed throughout the country except in the actual fjelds. Actual gaps not apparent; comparatively frequent occurrence in Nbt striking, as also the occurrence in only the eastern part of Gtl. Northernmost or highest localities are: Vrm Höljes, 1933 (Palm and LTH 1937, p. 116!); Dlr Älvdalen (HGL, coll. LTH); Hls Los (SJB); Jtl Svenstavik, 1943 (LDN); Ragunda (FRI, 2 specimens, VA!); Åre, June 25, 1936 (KMN, ML!); Ånn, June 1934, 3 specimens (LTH); Vbt Hällnäs, May 16, 1936 (HEQ!); Åsl Vilhelmina, July 21, 1936, 2 specimens (LTH); Lyl Sorsele, July 15, 1920 (GTZ, E.T. 1932, p. 46); Lul Pålkem, June 1941 (WRN!); Kwickjock, July 1924 (ARW!); Tol Karesuando, June 1930, June 1935 (BRC, RM!).

*Norway:* In the southeast widely distributed, and although sparser, probably uninterruptedly distributed along the southern coast as far as 6 Stavanger region and Tau in Ryfylke (HLS 1915, p. 12). The species seems to be missing in the actual western part of the country. Delimiting localities west and north: 16 Seljord and Vestfjorddal; 14 Bergset in Öystre-Slidre (MST); 13 Faberg (CTT); 25 Röros (MST); Aursund (N.E.T. 1937, p. 144). Farther north only highly scattered localities: 28 Steinkjer (N.E.T. l.c.); 31 Dönnä (STE, MO!); 32 Junkerdal, 34 Hadsel in Lofoten (SPS 1902, p. 23); 26 Målselv, two localities (SPS 1910a, p. 67; STA); 35 Tromsö and Tromsdal (SPS 1888–1889, p. 99); 41 southern Varanger, numerous localities (several collectors).

303 *Finland:* Widely but somewhat irregularly distributed; however, probably without actual gaps. Northernmost localities: Le Enontekis (SBJ 1873, p. 69; MH!); Li Ivalo (PPP 1905, p. 88; MH!); Lp Jakobselv (LBÅ 1933, p. 117!).

*Russian sector:* Only in southernmost Karelia (several collectors!), north as far as Kn Tolvaja (PPP 1899a, p. 9; MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 8). Estonia (SUM 1931; HAB in litt.); Latvia (SDL 1872; ULN 1884; LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 328), also Ireland (JHS and HLB 1902, p. 562).

*Total area:* Circumpolar species. In Europe south as far as the Pyrenees (FUE 1918, p. 47), Austria (HOR 1941, p. 91), Transylvania (PTI 1912, p. 11). Northeast as far as Arkhangel'sk (PPP 1907c, p. 307). Siberia (among others, SBJ 1880, p. 12; MDL 1936, p. 3), east as far as Lena (PPP 1906b, p. 23) and Kamchatka (JAC 1905–1908, p. 266). North America (Leng 1920, p. 46).

### Ecology

On the banks of stagnant or slow-flowing fresh or brackish waters, usually at larger bodies of water, probably always on more or less loamy subsoil. Lives in unshaded, intensely sun exposed, very wet places, but often at a considerable distance from open water, e.g., in swamp meadows. A more or less continuous cover of *Amblystegium* and other mosses (but not *Sphagnum*) is usually of major importance, in addition to moderately tall and dense *Carex* or swamp grasses. Mostly together with *Agonum versutum*. In the north does not exceed the coniferous forest timber line, at least not in Sweden. Records from Central Europe confirm its dependence on vegetation-rich banks (West 1940, p. 8; RSH 1842, p. 2; RTT 1908, p. 97; Dahl 1928, p. 37).

### Biology

Southern Swedish catches: III: 1; IV: 4; V: 34; VI: 39; VII: 9; VIII: 9; IX: 1. Predominantly a spring species. Immature beetles on July 21 (Åsl) and August 25 (Öld). In Denmark a distinct maximum abundance occurs in May and numerous larvae are observed in July and the beginning of August (LRS 1939, p. 318). Hence unquestionably a spring breeder, hibernating as an adult.

304

### Dynamics

Wings fully developed. Spontaneous flight observed near Nbt Luleå, May 29, 1938, in hot sunshine (LTH). In Finland found many times in sea drift (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37).

### Fossil Records

Finland (NI), postglacial (PPP 1911, p. 36). Belgium, interglacial (LAP 1902, p. 552).

### \**Brachynus crepitans* L.

#### Distribution

*Sweden:* Predominantly an eastern species with restricted and split distribution. I. On the mainland in the south, only four localities: "Northeastern Skåne"

(WLG 1866, p. 6; in coll. WLG, MM, an unlabeled specimen!). Hll Falkenberg (1 specimen, RGS! 1 specimen, ERC, MG!). Små Markaryd, July 1902 (MCH, E.T. 1904, p. 106); Kalmar (AHT, coll. MLC, HM!). II. On Öld and Gtl widely distributed and locally not rare. However, not found to date in northern Öld, nor on Fårön and Sandön Islands. III. In eastern central Sweden: Ögl Söderköping, 1 specimen (leg.?, MG!); Norrköping (leg.?, 1 specimen, LF!), April 24, 1921, 1 specimen (FRL!). In the Mälars provinces (Sdm, Upl, Vst) somewhat more widely distributed but usually only isolated occurrences. Delimiting localities: Sdm Nacka, June 15, 1906, 2 specimens (BRC!); Eskilstuna (JNS!); Vst Västerås, several specimens around 1910 (SDN, MG! SLL, VA!); Upl Uppsala (several collectors!), earlier sometimes in large numbers, finally May, June 1928 (ENG! LTH); Östervåla, August 1907, 1 specimen (OTT!). Near Stockholm already discovered in 1750 (ROL 1750); during May 1944 very numerous in Lovön (LDN 1944).

Erroneous: Reported since olden times from northern Sweden (Lapland, Nbt) (Portin; ZTT 1828, p. 42; 1840, p. 45) which, without doubt, is the result of confusion of localities (see LTH 1938, p. 22). The same may be true for the record "Hls" (GLL 1896, p. 26).

Not found in the rest of Fennoscandia. The Norwegian record—2 Modum (MOE, according to SHY 1879, p. 16)—has not been accepted by MST (Catalogus). Undoubtedly erroneous also is the old Finnish record from Ob (Julin 1792, p. 114).

*Adjacent regions:* In Denmark found only on Bornholm (West 1940, p. 52).  
 305 Estonia, only one old specimen from Dorpat (SDL 1891, p. 18). According to ULN (1884) in eastern Latvia. Not found in Leningrad region. British Isles (Joy 1932, p. 369), also Ireland (JHS and HLB 1902, p. 592).

*Total area:* Palearctic species. In Europe predominantly southern (e.g., only old records from northern Germany; HOR 1941, p. 353); south as far as southern Spain (FUE 1921, p. 225), Corsica (DEV 1935, p. 61), southern Italy, Sardinia, Sicily (LUI 1929, p. 147), Greece, and Crete (OTZ 1886, p. 213). East as far as Ural (JAC 1905–1908, p. 411). Northern Africa (BED 1895–1914, p. 317). Asia Minor (APE 1904, p. 348). Syria and Cyprus (CKI 1927–1933, p. 1618). Iran (BOD 1927c, p. 40). The Caucasus (CHD 1846, p. 64; SDR and LDR 1878, p. 64). Kirgizia (JAC l.c.). Western Turkestan (HEY 1880–1881, p. 16). Siberia, east as far as Altai (HEY l.c.).

### Ecology

The species lives on open, sun exposed, somewhat dry soil, with rich but not too tall vegetation of grasses and herbage (e.g., *Anthriscus silvestris*, *Daucus*, *Galium verum*, and similar plants). Likes loamy soil, but also found on efflorescent soil of limestone; the requirement for lime is highly probable and has also been assumed or asserted by foreign authors (FWL 1887, p. 149; BLK 1925,



p. 39; Dahl 1928, p. 201; BRN 1937, p. 17; HOR 1941, p. 353; JEA 1941–1942, p. 1108). The dependence on limestone could, however, be thermal; it has already been considered in central and northern Germany as a markedly thermophilic species, “restricted to particularly warm regions” (HOR l.c.). In our region the species occurs constantly with *Agonum dorsale*, and the same observation has been made many times in Central Europe (see that species). Since in North America the larva of another species of *Brachynus* (*janthinipennis* Dej.) is a parasite of a species of *Gyrinus*, it is not improbable that a similar relationship exists between *crepitans* and *A. dorsale*. Larval development has not been elucidated in any of the European *Brachynus* but the assumption of parasitism has already been expressed by JEA (1941–1942, p. 1104). Other successive species of *crepitans*: on Öld and Gtl *Harpalus azureus* and *melloti*, on Gtl frequently *rupicola* also.

### Biology

306 Swedish catches: II: 1; III: 0; IV: 5; V: 13; VI: 11; VII: 7; VIII: 10; IX: 3. In Denmark oviposition has been observed in June, and first instar larvae observed in July (LRS 1939, pp. 349, 433). The species certainly hibernates normally as an adult, a fact established in Germany also (BNN, *Ent. Rundschau*, 1910, p. 80; Rapp 1933, p. 152); however, hibernation may also occur in the larval stage since an immature beetle was found on May 23, 1940 (Gtl Hörsne, LTH), and MÜL (1926, p. 271) has already observed such beetles in April in northern Italy. In captivity the beetle apparently feeds on oatmeal (BLK 1925, p. 39).

### Dynamics

Wings fully developed and probably functional. However, as far as I know there are no observations of flight for this or any other species of *Brachynus*. It must be assumed that the wings are utilized only exceptionally. The fact that the species conservatively clings to definite, often very restricted localities, and the absence of any records from drift material support this conclusion.

\**Bradycellus collaris* Payk.

### Distribution

*Sweden*: Found in all provinces but not uniformly distributed. In the western half of southern Sweden especially frequent; on Öld and Gtl notably rare. Toward the north scarcer and usually occurs only as solitary individuals. Apparently an actual gap in distribution occurs north of latitude 64° N, between the fjeld area (which is in direct continuity with the Norwegian area) and the area in the Bothnian coastal regions. Whether a second gap occurs right there (about latitude 65° N) between Vbt Hällnäs (HEQ!) and Nbt Luleå (LTH)



has not been decided. The northernmost localities are situated in the Abisko region (several collectors! ZTT 1828, p. 39; BRD 1934, p. 227).

*Norway:* Absent in the extreme northeast, but otherwise seems to be distributed throughout the country, although rather unevenly. It has, for example, not been recorded to date in the border regions toward Sweden, between latitude 60° and 63° N. In the actual western part of the country there are only a few scattered localities, so that an actual gap in distribution may be present in provinces 8 and 19; north of the Trondheim region probably another gap occurs. Localities particularly numerous in the southeast and in the north between about latitude 68° N and 70° N. Delimiting localities in this region: 35 Nordfugløy (SPS 1885a, p. 29); Skjervøy (SPS); 38 Kåfjord in Alta (MST); 39 Kautokeino (ZTT 1828, p. 39; 1840, p. 44).

*Finland:* In the southern and central parts widely and continuously distributed, usually frequent, becoming scarcer toward the north, and north of the Arctic Circle only near Li Karesuando (SBJ 1873, p. 133). Otherwise, northernmost localities: Om Siikajoki (WUO, MH!); Ok Suomussalmi (SSK, MH!); Ks Kuusamo (MKL, MH!), Paanajärvi, 1939 (PFF 1943, p. 121).

*Russian sector:* On the southern coast of the Kola Peninsula, five localities, east as far as Lv Tetrina (PPP 1905, p. 98). Farther, near Kk Soukelo (PPP l.c.; MH!). In southern Karelia numerous localities (several collectors!), north as far as Kn Semsjärvi (CRP!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and fairly frequent (West 1940, p. 31). Estonia (HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 567).

*Total area:* Palearctic species. In Europe distributed south as far as northern Spain (FUE 1920, p. 141), southern Italy (LUI 1929, p. 90), Bulgaria (APF 1904, p. 210). The Caucasus (SDR and LDR 1878, p. 82), western Siberia (SBJ 1880, p. 45; RM!).

## Ecology

Without doubt the most eurytopic of our species of *Bradycellus*. Primarily lives (usually together with *similis*) among *Calluna vulgaris* but on many kinds of soil (even on peat and rock) except for very dry sand since a distinct layer of humus is necessary. Soil moisture slight to marked. It secondarily lives, especially in the north, on grassy or meadow soil with sparse vegetation, in leaf litter, or grass residue under small stones in moderately shaded places, for example at forest fringes. Gravelly or sandy soil (moraine) is preferred here. In the fjelds it crosses the timber line only exceptionally; only two records known to date from the lower *reg. alp.* (as far as 800 m): Lul Sarek (JNS 1926, pp. 902, 909); Toi Abisko (BRD 1934, p. 227); 1 specimen in each case. The predilection for *Calluna* soil has also been noted in Central Europe (HSN,

F.F. 1912, p. 92; ROG 1856, p. 13; LTZ 1885–1892, p. 27; E.B. 1913, p. 260; Rapp 1933, p. 90).

308

### Biology

Southern Swedish catches: I: 1; II: 1; III: 7; IV: 29; V: 36; VI: 56; VII: 20; VIII: 18; IX: 17; X: 7; XI: 3; XII: 1. The maturation period for adults is unusually long; I have seen numerous immature beetles from July 7 (Ång) and July 10 (Dsl) until September 20 (Jtl), and even three specimens on May 7, 1944 (Jtl Fors, Palm!). Normally, however, the species hibernates as an adult. The exception mentioned by PME (S.H.A. 1939, pp. 54, 59) that in Finland there are two generations per annum is erroneous. In captivity the beetles feed on oatmeal and soft bread (LTH).

### Dynamics

Wing dimorphism evident, and recorded in Central Europe also (MÜL 1926, p. 198; HEB and MEX 1933, p. 96; BUR 1939, p. 185). In brachypterous specimens the wings are reduced to a small narrow scale. Macropterous individuals, on the other hand, have fully developed wings that are functional. Flight observations: Hls Los, August 1930, August 1931, 4 specimens (SJB), and also in Central Europe (S.E.Z. 1843, p. 90; Rapp 1933, p. 90; HOR in litt.). In Finland numerous specimens have been recovered from sea drift (Frey 1937, p. 436; STÅ 1938, p. 20; PME 1944, p. 38).

### \**Bradycellus csikii* Laczó

#### Distribution

*Sweden*: Only four localities known to date in western Skå, but the species is possibly somewhat more widespread since it was earlier confused with *harpalinus* (LTH 1943a, p. 35). Kungstorp, "Kungstörps-backar," locality of *Orobancha major* in a small gravel pit, together with one specimen of *Amara fusca*, August 9, 1936, 1 specimen (LTH); Lund, October 30, 1938, male (CHR, coll. LTH); Lomma, August 17, 1936, 3 specimens from sandy fields at the old loam pit, collected together with three specimens of *harpalinus* (Palm!); Hälsingborg, Raus-marker, May 9, June 20, 1943, 4 specimens (PLQ!).

No records from the rest of Fennoscandia.

*Adjacent regions*: In Denmark likewise recorded only recently, but probably widely distributed; in Jylland as well as on the islands; however, not found to date on Bornholm (West 1940, p. 31; LTH l.c.). No records from the other neighboring countries.

*Total area*: Possibly solely European. Outside the region, known only in  
309 Central Europe, south as far as Holland (HOR 1941, p. 242, northern Italy

(SBR 1933, p. 133), and Hungary (*loc. class.*); east as far as Slovakia (ROU 1930, p. 162) and southeastern Poland (SBR l.c.). Certainly more widely distributed.

### Ecology

The mode of life of this species is almost unknown. According to records from Central Europe it occurs on "gravelly soil" (SBR 1933, p. 133) and "heavy loamy soil" (NBG, according to HOR 1941, p. 242). The few Swedish records do not contradict the assumption that the species lives on heavier soil than does *harpalinus*.

### Biology

Nothing is known about the cycle of development.

### Dynamics

The Swedish specimens (as well as the Danish specimens seen by me) are fully winged and certainly capable of flight.

### \**Bradycellus harpalinus* Serv.

#### Distribution

*Sweden*: Widely distributed in Skå and the inland where the northernmost localities are: Riseberga, June 1900 (ROS, ML!); Ringsjön region (several collectors!); Nosaby, August 1907, 2 specimens (ROS, ML!). Farther north there are only solitary records on the coasts. In the west: Hll Enslöv, September 1940 (FGQ!); Falkenberg, June 1935 (Palm, coll. LTH); Onsala, June 1925 (LTH); Vgl Göteborg (several collectors! Most recently Landala, June 3, 1928, 2 specimens LTH). In the east: Ble Sölvesborg, August 21, 1930 (Holm, coll. LTH); Öld Stora-Rör region (SDN, RM! LJ!); Böda, 1 specimen, Byxelkrok, 3 specimens, August 1937 (HNS, RM!); Gtl Fårön, Sudersand, 2 females (JNS! Also in MU!).

Doubtful: Små (GLL 1896, p. 30; no voucher specimen).

Erroneous: Since generally winged specimens of *collaris* were earlier identified as *harpalinus*, the collections contain some erroneous identification. Among those that have been published, the find from Ögl Omberg (E.T. 1931, p. 34!).

*Norway*: The species has not been established here to date, but according to STA (in litt.) has recently been collected by JEN in 6 Jæren at four different localities on the coast.

Absent in eastern Fennoscandia.



310 *Adjacent regions:* In Denmark widely distributed, also on Bornholm (LOH, coll. JNS!) but earlier partly confused with *csikii* (West 1940, p. 31; LTH 1943a, p. 35). Estonia, only on Ösel (HAB 1936a); the record from Dorpat (HAB, Määr, Zolk 1933) is erroneous (HAB in litt.). Not known in Latvia and Leningrad region. British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 567). Shetland (West 1930, p. 75).

*Total area:* Western Palearctic species. In Europe south as far as Portugal and central Spain (FUE 1920, p. 141), Corsica (JEA 1941–1942, p. 710), central Italy, Sicily (LUI 1929, p. 90), Greece (APF 1904, p. 210). East as far as Russia, Kiev (JAC 1905–1908, p. 387). Northern Africa (BED 1895–1914, p. 153). Madeira (JEA l.c.). The Caucasus (RTT 1900, p. 132). Possibly partly confused with *csikii*.

### Ecology

A species exclusively inhabiting sandy soil, especially at the coast on fully arrested inland dunes where the soil is not very dry and the sand is mixed with humus. Inland at similar places but only solitary. Also under *Calluna* together with *collaris* and *similis*. Various records from Central Europe likewise indicate a predilection for dune terrain (see D.E.Z. 1914, p. 397; S.E.A. 1915, p. 212). Otherwise the species seems to be less fastidious in the south (see Rapp 1933, p. 91) and has been recorded even from bog regions† (HOR 1941, p. 241). In Denmark noted as a forest species (West 1940, p. 31), which is not at all the case with us. It is characteristic of this species to climb plants in the evening (also see WHF 1881, p. 35) and thus it is easily caught by sweeping.

### Biology

The few Swedish catches are distributed as follows: II: 2; III: 1; IV: 1; V: 5; VI: 7; VII: 2; VIII: 15; IX: 2; X: 2; XI: 0; XII: 1 (numerous). Most of the adults hibernate but, as assumed by LRS (1939, p. 420) for Denmark, autumn breeding might possibly be usual and hence hibernation of larvae normal; several immature beetles were caught near Skå Svinaberga, June 28, 1931 (Palm!).

### Dynamics

311 Wing dimorphism evident and already established in southern Europe (MÜL 1926, p. 197; 1933, p. 208). However, I have seen only one brachypterous specimen from Sweden to date (Skå Kämpinge, VA!); its wing rudiment is not

†(Corrected to "moss regions" in the Supplement (p. 856) to Part III of this work; suppl. gen. edit.).



even half the length of an elytron. The flight capacity of the macropterous form has been corroborated many times in the other parts of Europe (E.N. 1888, p. 25; E.M.M. 1930, p. 257; HOR 1941, p. 241, and in litt.).

*Bradycellus ponderosus* Lindr.

Distribution

*Finland:* This species is known to date only from the type (female), which was discovered near Ks Paanajärvi (close to the Russian border), July 2, 1935, by KRG (N.E. 1939, p. 118).

Ecology

One specimen only found on a sandy river bank with sparse vegetation (N.E., l.c.).

Dynamics

Wings fully developed and probably functional. It is possible, therefore, that the occurrence in the above-mentioned biotope was quite accidental.

*\*Bradycellus (Tetraplatypus) similis* Dej.  
(*circumcinctus* C.R. Sahlb., *atratus* Zett.)

Distribution

*Sweden:* Area with little continuity. Found only in the southern half of the country where it is widely distributed in the west, frequently occurring in very large numbers, but east and north more sparsely distributed (e.g., on Gtl only in Sandön). Delimiting localities: Gtl Sandön, found many times (JNS 1925, p. 70!); Små Lofta and Gamleby, 1932 (LOH, according to JNS); Sdm Kila, July 26, 1933, 2 specimens (Loh, according to JNS); Äsgård (ERC, 2 specimens, MG!); Dalarö, August 2, 1922 (LBÅ!); Upl Djursholm, 1943, 1944 (LTH); Uppsala region (CDS 1873, p. 18); Gst Grönsinka, August 1943, numerous (LTH); Dlr Ludvika, Våghalsen, May 27, 1938, 2 specimens (WSL!); Kopparberg, Jungfruberget, May 8, 1937, 3 specimens (KLF!).

Doubtful: Hls (leg.?, coll. GLL!).

Erroneous: Lapland (SCH, according to THS 1859, p. 287).

312 *Norway:* Exclusively in the coastal region of the south, between the Swedish boundary and 7 Bergen, Solheimsviken, 1871, 1874 (SPS 1875, p. 23). In Jæren and in Ryfylke (6) still frequent (HLS 1915, p. 32).

*Finland:* Very local but in the south somewhat widely distributed, especially in the southwest, where the delimiting localities are: Ab Nystad (SDM, MH! HLL); St Yläne (SBJ 1873, p. 133; MH!); Ta Tammela (HLL); Ni Hel-

sinki region (several collectors!). Southeast, five localities: Ik Muolaa (PFF); K1 Jaakkima (SBJ, MH!); Sa Joutseno (BLQ); Taipalsaari (SBJ l.c.; MH!); Kristina (NUM, RNK). Farther north two isolated localities: Om Vetil (NSL 1927, p. 37!); Haapavesi (HEL, 2 specimens, NL!). No records from Åland.

*Russian sector:* Only on the Swir River (PPP 1899a, p. 18), Pirkinitisi, 1942 (RNK!).

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) but not frequent (West 1940, p. 30). Estonia, four localities in the north (DPF 1924; HAB in litt.); Latvia (BRM 1930; LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 567).

*Total area:* Euro-Mediterranean species. In Europe south as far as southern Spain (FUE 1919, p. 140), northern Italy (LUI 1929, p. 90), Croatia (APF 1904, p. 209). East as far as Russia, Gor'kii (JAC 1905–1908, p. 387). Northern Africa (BED 1895–1914, p. 153).

### Ecology

A stenotopic inhabitant of *Calluna* biotopes, occurring only where *Calluna* tufts are underlaid with a pronounced layer of humus. Hence absent in very dry, purely sandy heaths. Moreover, found on various kinds of soil and on gravel, sand, and rock, as well as on peat. Soil moisture slight to marked (not in wet *Sphagnum*). Usually in quite open terrain; tolerates only moderate shade. All records from the rest of Europe confirm that the species is dependent on *Calluna*, citing them is therefore superfluous. But it is noteworthy that in the eastern Alps it is considered “predominantly a bog animal” (HEB and MEX 1933, p. 96). The occasional occurrence on barren banks, often in large numbers, for example at lake Vättern close to Ögl Motala, September 13, 1933 and near Nässja, September 3, 1934 (LTH), and at the sea (S.E.Z. 1915, p. 212), is undoubtedly the result of swarming flights.

313

### Biology

Swedish catches: IV: 9; V: 11; VI: 19; VII: 10; VIII: 15; IX: 13; X: 4. In Denmark maximum abundance already in May and the decline in July is much more pronounced (LRS 1939, p. 343). Immature beetles observed from July 9 (Små) to August 10 (Gst). Spring breeder, hibernating as an adult.

### Dynamics

It is possible that this species exhibits wing dimorphism since JEA (1941–1942, pp. 708, 711) mentions it as “aptère” in France. In our region I have only seen specimens with fully developed wings. There are two flight observations from

Germany (WHF 1881, p. 35; HOR in litt.). In Finland three individuals were caught in sea drift (Frey 1937, p. 436); compare also the above-mentioned accidental occurrence on banks.

*\*Bradycellus verbasci* Dft.

Distribution

*Sweden*: Only two records in Skå in recent years. Nybro, August 13 and 14, 1936, 2 specimens, one under *Alnus* and *Salix* foliage at the edge of a *Phragmites* swamp close to the seashore, the other swept (Palm!); Lund, 1 specimen flew to light, August 1939 (EHB, ML!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark widely distributed, extending also into northern Jylland and on Bornholm (West 1940, p. 30); seems to have increased in numbers in recent years. Not found in the Baltic States. British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 567).

*Total area*: Western Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 140), Corsica (DEV 1935, p. 44), southern Italy, Sardinia, Sicily, Malta (LUI 1929, p. 90), Greece (OTZ 1886, p. 209). East as far as Ural (JAC 1905–1908, p. 387). Northern Africa (BED 1895–1914, p. 152). Asia Minor (APF 1904, p. 209). Iran (BOD 1927c, p. 43).

Ecology

The species may be closest to *harpalinus* in its mode of life. It seems to require sandy soil according to reports from Central Europe (LTZ 1855–1892, p. 27; SRN 1926, p. 23; DHM 1928, p. 184) and is found partly in heath, e.g., among  
 314 *Calluna* (BACH 1851, p. 53; BRN and PTZ 1933, p. 236) and partly in forest glades (West 1940, p. 31; GAL 1886, p. 295; GRD 1937, p. 55). Like *harpalinus* it has a propensity for climbing plants in the evening (see JNN 1905, p. 196) and is caught by sweeping.

Biology

In Denmark the species is found throughout the summer, but distinct maximum abundance in August. Hence LRS (1939, pp. 343, 421) assumes that it breeds in autumn, but monthly records from Germany (Rapp 1933, p. 90; BUR 1939, p. 186) also indicate its occurrence in large numbers in spring. It is more prudent to consider this question unresolved just now. LRS (l.c.) also assumes that at least some of the adults hibernate.



## Dynamics

Wings fully developed. One Swedish specimen was caught in flight (see above); there are similar observations from Germany also (DHM 1928, p. 184), but especially from England (E.M.M. 1924, pp. 154, 155; 1925, p. 113; 1930, p. 257).

\**Brosicus cephalotes* L.

## Distribution

*Sweden*: Markedly southern species, continuously distributed north as far as about latitude 61° N. Its occurrence only on the west coast of GtI is remarkable, as well as its seeming total absence in the Skärgård of Sdm and Upl. Northern delimiting localities: Upl Skutskär, June 28, 1936, 1 dead specimen on the seashore (LTH); Dlr Falun region (several collectors!); Rättvik, July 25, 1942 (TJT); Transtrand, 1937, 2 specimens (RGS!); Vrm Långflon, June 15, 1933 (Palm and LTH 1937, p. 116!).

*Norway*: In the southeast rather widely distributed; then separate localities along the southern coast as far as 6 Jæren (rather frequent; HLS 1915, p. 14). Northernmost inland localities: 15 Konsberg region, several localities (MST); 2 Norderhov (SIE 1875, p. 91); 12 Minne (WRL); 10 Elverum (SIE l.c.).

Doubtful: 28 Nes in Verdal, July 8–10, 1840 (ZTT, 1 specimen, ML!). The locality seems so improbable that wrong labeling must be assumed.

315 *Finland*: In the southern and central parts frequent and distributed without gaps; on the west coast, however, not found north of Ab Iniö (WKS, MH!). On Åland only near Jomala (HLL, PFF) and Geta (STK, PFF); seems to be absent on the islands in the Gulf of Finland. Northernmost localities: Oa Seinäjoki (KNG, PHJ); Tb Pihtipudas (SAR); Sb Tuovilanlahti (SBJ 1873, p. 92; MH!); Kb Nurmes (SBJ, MH!).

Doubtful: Ob (Julin 1792, p. 114). Ok Ruhtinassalmi (SSK, 1 specimen, MA! See footnote under *Anisodactylus binotatus*).

*Russian sector*: Several localities in southern Karelia (several collectors! PPP 1899a, p. 12) north as far as Kn Semsjärvi (CRP!).

*Adjacent regions*: Found throughout Denmark and very frequent (West 1940, p. 11). Estonia, including Ösel (HAB 1936a) and Dagö (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 331), also Ireland (JHS and HLB 1902, p. 564). Shetland (West 1930, p. 74).

*Total area*: Palearctic species. In Europe south as far as southern France (DEV 1935, p. 23), central Italy (LUI 1929, p. 57), Bosnia (APF 1904, p. 77). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 308). The Caucasus (ECH 1930a, p. 144; 1930b, p. 214; LSH 1936, p. 139). Turkmenia and western Turkestan (HEY 1880–1881, p. 24). Western Siberia (HEY l.c.; PPP 1907d, p. 5).



## Ecology

On more or less barren, flat, sun exposed and moderate to very dry soil. Predominantly on sand (but not on very loose quicksand) which, however, often shows a strong admixture of loam and even humus; rarely in garden soil and the like. Vegetation often absent or at least bald patches present. Fond of lakesides or seashores. It has also been noted in other countries that the species does not live exclusively on sand (West 1940, p. 11; Dahl 1928, p. 49). The insect digs deep passages, for which it has a special predilection, under planks or under large stones that are not too deeply embedded.

## Biology

Swedish catches: III: 1; IV: 4; V: 20; VI: 59; VII: 44; VIII: 44; IX: 12; X: 1. In Denmark maximum abundance in August, and from October to March no adults have been found at all, only larvae (LRS 1939, p. 320). Hibernation  
316 thus takes place normally in the larval stage, but solitary beetles also survive to the following spring (LRN 1936, p. 104; LRS, l.c., p. 372). Both immature beetles examined by me were found as late as August 2 (Små) and October 10 (Ble). Distinctly predaceous and the old record of this species damaging cereal (Rapp 1933, p. 33) has not been confirmed. The opening of a beetle tunnel is often strewn with remains of flies and other victims (Vrm Deje, LTH); these also include *Staphylinus stercorarius* Ol. (PME, S.H.A. 1939, p. 59), amphipods (BLK 1925, p. 18), and conspecific individuals (BUR 1939, p. 71).

## Dynamics

Wings fully developed, with a strong apical part, which alone could possibly transport the body. However, the elytra are so firmly joined anteriorly along the suture (apparently completely coalesced) that their spread is surely impossible. I therefore believe that the insect is incapable of flight. Moreover, a more or less regular flight of this large conspicuous beetle would scarcely have escaped attention.

\**Calathus ambiguus* Payk.  
(*fuscus* Fbr.)

## Distribution

*Sweden*: Widely distributed in the south but with little continuity and highly local. However, actual gaps in distribution are not apparent. Northernmost localities: Boh Fjällbacka, 1936, 4 specimens (CDB, coll. LTH); Vgl Kinnekulle (TBL!); Nke Örebro (JNS!); Ögl Norrköping, 1924, 1 specimen (WSJ!); Stockholm (several collectors!); Upl Runmarö (HFS, 1 specimen, LÖ!); Djurö,

1937, numerous (LTH); Hacksta, 1922 (ING, 1 specimen, coll. LTH); Uppsala (several collectors!).

Erroneous: "Sk.-Lpl." (GLL 1896, p. 22).

Norway: Only two localities: 1 Hvaler, Kirkeøy, June 20, June 21, 1915, numerous (MST, N.E.T. 1920, p. 60; MO!). 5 Lister, Kviljo, September 30, 1921 (N.E.T. 1923, p. 256; 1 specimen, MO!).

Erroneous: According to MST (l.c., 1920) all older Norwegian records (SIE 1875, p. 99; SHY 1879, p. 19; HLS 1890, p. 16; ULL 1899, p. 295) are erroneous.

Finland: Rare and only in the extreme south. Al Sund (FRS!). In the southwest several localities, north as far as AbLojo (KRG!), east as far as 317 NI Helsing (STN!). In the southeast (Ik) several localities, north as far as Sakkola (SBJ 1871a, p. 333; 1873, p. 116; MH!); also Sa Taipalsaari (SBJ 1873; MH!).

Doubtful: Kb Korpiselkä (HBL, according to SBJ 1873; no record specimen).

Russian sector: No records to date.

Adjacent regions: In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 41). In Estonia, including Ösel (SUM 1931), rare and to date not found on the northern coast (HAB in litt.). Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 368).

Total area: Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 194), southern Italy, Sardinia, Sicily (LUI 1929, p. 128), Greece (APF 1904, p. 285). East as far as Ural (JAC 1905–1908, p. 326). Asia Minor (APF l.c.; SZM 1937, p. 31). The Caucasus (SDR and LDR 1878, p. 69). Trans-Caspian region (SZM l.c.). Western Turkestan (HEY 1880–1881, p. 27). Western Siberia (HEY l.c.; JAC l.c.).

### Ecology

In mode of life quite similar to *erratus*, in whose company it usually occurs. However, this species is more stenotopic, always lives on sand or fine gravel, often with a more or less strong admixture of loam (more seldom of humus), and seems to be predominantly xerophilous since it tolerates no shade and seeks distinctly warm, sun-exposed places. Avoids completely barren soil, but the vegetation must be very sparse, either short (dry grasses, *Galium verum*, *Thymus*, etc.) or only patchy. Typical example: Ögl Motala, dry sandy southern slope (old fallow land) with sparse, in part quite withered vegetation between large, barren sandy surfaces: *Scabiosa arvensis*, *Rumex acetosella*, *Centaurea scabiosa*, *Spergula arvensis*, *Polygonum aviculare*, etc. The species was found in large numbers under the leaf rosettes of the larger plants; September 23, 1935 (LTH). Its predilection for sandy soil has also been reported from other

parts of Europe, but according to GRD (1937, pp. 42, 79) is particularly true of northern Germany, while in the Leipzig region, for example, the species is more eurytopic; in Westphalia found on "limy and clayey soil" (WHF 1881, p. 19). A particular requirement for heat has also been noted in Germany (Dahl 1928, p. 94).

## Biology

Swedish catches: III: 2; IV: 9; V: 21; VI: 29; VII: 25; VIII: 20; IX: 7; X: 2. Immature beetles occur exclusively in June, from June 11 (Ögl) to June 23 (Vgl). It is certainly an autumn breeder, as already assumed for Denmark (LRS 1939, p. 388), hibernating in the larval stage and, at most, in small measure as an adult (see data in Rapp 1933, p. 126).

## Dynamics

Wing dimorphism reported often (see GYL 1810, p. 127; SDT 1841, p. 236; LTZ 1847-1852, p. 147; EVS 1898, p. 68). According to SZM (1937, p. 31) brachypterous individuals are found only on Norderney Island. SHM (1860, p. 394) explicitly states that the species is constantly macropterous in Germany. In Fennoscandia I have seen only specimens with fully developed wings. In Finland (Ni Tvärminne), PME (in litt.) saw three beetles in flight on May 26, 1939 in the evening, and has also found (1944, p. 39) eight specimens in sea drift.

\**Calathus erratus* C.R. Sahlberg  
(*fulvipes* Gyll., *flavipes* Dft.)

## Distribution

*Sweden*: Distributed without gaps and almost uniformly as far as about latitude 62° N. Farther north only in coastal regions. In Vbt and Nbt only one locality each, so that the connection with, or the delimitation from, the Finnish stock remains uncertain. Northernmost or highest localities are: Dlr Särna (AND, LF); Hls Los (SJB); Ramsjö, 1943 (LDN!); Mdp Liden, 1937 (BRC, RM!); Jtl Bispgården, 1930, 1 specimen (LTH and Palm 1934, p. 37!); Ragunda (FRI, 2 specimens, VA!); Ång Östërasen, 1940 (BRD); Mellansel, 1930, 1 specimen (LTH and Palm, l.c.!); Vbt Hällnäs, Bodarna, May 25, 1936, 1 specimen (HEQ!); Nbt Pitsund, July 16, 1936, 2 specimens (LTH).

Doubtful: Lapland, "in Lapponia, rarius" (ZTT 1828, p. 20; 1840, p. 33; no voucher specimen).

*Norway*: Occurs almost throughout southern Norway, except for the fjeld region and the most western part of the country. North of Trondheim Fjord (N.E.T. 1937, p. 147) only a few localities: 30 Grong (LYS in litt.); 32 Saltdal,



three localities: (several collectors); 31 Bodö (SBJ), June 1925 (LTH).

319 Doubtful: 37 Hammerfest (STR, according to SPS 1899, p. 148; see *Bembidion lampros* and *velox*).

*Finland*: North as far as about latitude 65° N universal, then becomes scarcer. Northernmost localities: Ob Kemi (ENW, MH!); Rovaniemi (leg.?, MH!); Lk Sodankylä (SUD, MH!); Ks Paanajärvi (several collectors!).

*Russian sector*: Three localities on the Kola Peninsula: Lt Nuorti (FSI, MH!); two localities on the southern coast (PPP 1905, p. 93; MH!). Solovetsk Island (LEV, MÅ!). In southern Karelia many localities (several collectors!), north as far as Kn Semsjärvi (CRP!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 41). Estonia, including Ösel (SUM 1931; HAB 1936a); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 368), also Ireland (JHS and HLB 1902, p. 576).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 193), southern Italy (LUI 1929, p. 128), Bulgaria (APF 1904, p. 285). In the northeast as far as Pechora (SBJ 1898, p. 339). Asia Minor (according to CKI 1927–1933, p. 775). The Caucasus (SDR and LDR 1878, p. 69; ECH 1930a, p. 147; 1930b, p. 218). Kirgizia (HEY 1880–1881, p. 27). Siberia (among others, SBJ 1880, p. 37; RM!) extending into the easternmost parts (HEY l.c.; PPP 1906b, p. 35).

### Ecology

On more or less dry, usually sandy or gravelly soil, in more or less open situations, but less fastidious and often occurs in places with a strong admixture of loam, humus, or even peat. More resistant to desiccation than other species of *Calathus* and hence found, for example, on quite dry quicksand. On the other hand, it also tolerates some shade and not rarely lives at forest fringes, pine heaths, less exposed gravel pits, etc. Ground vegetation very diverse but must not be too dense: on dry grassy and meadow soil, as well as on heaths, often under *Calluna*; also at almost barren places. The eurytopic character of the species is also evident in Central Europe (see Dahl 1928, p. 95; GRD 1937, p. 42).

### Biology

Southern Swedish catches: II: 2; III: 4; IV: 24; V: 27; VI: 96; VII: 72; VIII: 72;  
320 IX: 23; X: 6. Immature beetles numerous between June 10 (Vgl) and July 7 (Små). In Denmark larvae found from end of March to beginning of May (LRS 1939, p. 327). It thus reproduces in autumn, and hibernates in the larval stage; a comparatively larger number of adult beetles survive to the following spring than recorded for *ambiguus*.



## Dynamics

Wing dimorphism (or more correctly, polymorphism) evident, and observed by earlier authors (e.g., LTZ 1847–1852, p. 148; Dahl 1928, p. 95); nevertheless JEA (1941–1942, p. 848) still designates it as “ailé”. In the brachypterous form the wing rudiment is, at most, as long as an elytron (see also PME 1944, p. 146), usually much shorter, and without a reflexed apical part. The macropterous form has fully developed wings, but the apical part is never as well developed as in *ambiguus*. It has undoubtedly flight capacity, since only this form has been found, and in large numbers, in sea drift from southwestern Finland (PME l.c., pp. 39, 146).

## Fossil Record

Doggerbank, postglacial (Bell 1922, p. 47).

\**Calathus fuscipes* Gze.  
(*cisteloides* Panz.)

Distribution  
(map in LTH 1939a, p. 243)

*Sweden*: Occurs throughout the south, usually frequent, and distributed apparently without gaps. It is strange however that the species was first discovered in 1936 in Nke, near Latorp, and in 1939 also near Hidinge, Svenshyttan, and only one specimen in each case (JNS). The northern limit is fairly distinct and represented by the following localities: Vrm Arvika region, several specimens (RGS! EVK!); Vst Grythyttan, 1936, 4 specimens (LTH); Dlr Ludvika, Brunnsvik, 1917, 3 specimens (FRL!); Norrbärke, Vanbo, 1936 (KLF); Säter (AND, LF); Upl Älvkarleö, 6 specimens, Skutskär, 3 specimens, 1936 (LTH).

Doubtful: Jtl (leg.?, 1 specimen, MG!).

Erroneous: Lapland, “Lapp. merid., rarius” (ZTT 1828, p. 19; 1840, p. 33; no voucher specimen).

- 321 *Norway*: In the coastal region of the south widely distributed and frequent, along the western coast reaching Trondheim region, northernmost near 26 Fröya; Vallersund (HSS, according to STA); 28 Steinkjer (N.E.T. 1937, p. 147). Only in the southeast is it also found inland where the highest localities are: 17 Austad (STE, MB!); 16 Vestfjorddal (HLS 1891a, p. 16); 14 Torpa; 10 Åmot. Surprisingly, absent in Sogn (19).

*Finland*: Only in the southwest and southeast with a distinct gap in between. I. On Åland frequent (several collectors!), also on the small islands west as far as Ab Korpo (WEG!). On the mainland only two definite localities: Ab Åbo (SBJ 1873, p. 116), Runsala (PHJ); NI Ekenäs, July 1937 (BRK!). II. In

the southeast: Ik province not rare (several collectors!). Ka Viborg (MNH, MH!); Sa Joutseno (THG! BLQ).

Doubtful: Helsinki (SBJ 1873, p. 116; in MH, 1 specimen, "Nylandia, Sahlberg" [possibly C.R. Sahlberg]! No other voucher specimens).

*Russian sector*: Definitely not established, but reported by GÜN from Olonetsk province (PPP 1899a, p. 4).

*Adjacent regions*: In Denmark all over and very frequent (West 1940, p. 41). Estonia, in the southern half, including Ösel (SUM 1931; HAB in litt.); Latvia (SDL 1872; ULN 1884; BRM 1930). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 368), also frequent on Ireland (JHS and HLB 1902, p. 575). Shetland (West 1930, p. 75). Faeroe Islands, frequent (West 1930, p. 15).

*Total area*: Western Palearctic species. In Europe south as far as central Spain (SZM 1937, p. 24), Corsica (DEV 1935, p. 55), northern Italy (LUI 1929, p. 128), Sicily (SZM l.c.), Greece and Crete (APF 1904, p. 284). East as far as Crimea (APF l.c.). Northern Africa (SZM l.c.). Asia Minor, east as far as Iran, Syria, Palestine (SZM l.c.; BOD 1927a, p. 67; 1927c, p. 27). The Caucasus (SDR and LDR 1878, p. 68; ECH 1930a, p. 147; 1930b, p. 218).

### Ecology

An eurytopic species of open terrains, but also tolerates some shade and occurs even in sparse deciduous forests. The condition of the soil is of little consequence: found on sandy, gravelly, and loamy soil with a more or less distinct admixture of humus. Absent from pure sand and peat. Often occurs  
322 together with *erratus*, but not markedly xerophilous and thrives also in tall meadow vegetation, as well as in gardens, fields, and other cultivated soils. In general the species is strongly favored by culture.

### Biology

Swedish catches: II: 4; III: 6; IV: 26; V: 51; VI: 98; VII: 118; VIII: 79; IX: 26; X: 10; XI: 2. Numerous immature beetles from June 10 (Vgl) to July 6 (Små). In Denmark larvae found mainly in September and October, but also in May (LRS 1939, p. 327). An autumn breeder that hibernates predominantly in the larval stage but also (and to a greater extent than *erratus* and *ambiguus*) as an adult. There are older records of this species causing damage to cereals and forest seeds (BLK 1925, p. 33; BUR 1939, p. 149), but it is undoubtedly mainly carnivorous. Nibbling of strawberries and melons (BUR l.c.) may have been due to thirst. A pure coincidence is the record of a pupa in an acorn attacked by *Balaninus* (BLK and BUR, l.c.).

## Dynamics

This species is constantly brachypterous and flightless. The scalelike wing rudiment does not attain even half the length of an elytron. The remark by LTZ (1847–1852, p. 146)—“wings usually reduced”—is therefore difficult to understand; likewise inexplicable is the record “in gas tanks” in Elberfeld (CRN 1884, p. 11; see p. 15 above).

## Variation

In the Mediterranean region and the Near East the species is extremely variable and split into numerous subspecies. In the rest of Europe more homogeneous, and in our region, in addition to size, variable only to the extent that red- and black-legged individuals occur at random and apparently without geographic demarcation. Intermediate forms rare.

## Fossil Records

Denmark, postglacial (HNR 1933, p. 129). England, postglacial (Bell 1922, p. 47).

*\*Calathus melanocephalus* L.

## Distribution

*Sweden*: Distributed throughout the country, and certainly without gaps. Not yet recorded for only a short stretch of the eastern coast (Små, Ogl). Absent in the higher fjeld regions. Northernmost locality: Tol Kummavuopio in Karesuando, 1935, 5 specimens (BRC, RM!).

*Norway*: Distributed throughout the country continuously and without recognizable gaps; even occurs at the tips of the northernmost peninsulas and on Magerøy in the extreme north (SIE 1875, p. 99; SZM 1937, p. 42). In northern Norway according to SPS (1888–1889, p. 114) the most frequent of all beetles.

*Finland*: Universally distributed, also in the fjelds. Gaps not ascertainable.

*Russian sector*: Likewise universal, and also in the tundra in the north. Gap between the Arctic Circle and latitude 63° N undoubtedly due to insufficient investigation.

*Adjacent regions*: In Denmark all over and very frequent (West 1940, p. 41). Estonia, including Ösel (SUM 1931; HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 368), also Ireland (JHS and HLB 1902, p. 576), Shetland (West 1930, p. 75). Faeroe Islands (West 1930, p. 16). Iceland (LTH 1931, p. 173).

*Total area*: Palearctic species. In Europe south as far as central Spain (FUE 1920, p. 194), Corsica (DEV 1935, p. 55), southern Italy, Sardinia (mon-



tane; LUI 1929, p. 128), Greece (OTZ 1886, p. 212; SZM 1937, p. 41). In the northeast as far as Kanin (PPP 1909, p. 9) and Pechora (SBJ 1898, p. 339; PPP 1907c, p. 309). Northern Africa (BED 1895–1914, p. 207; SZM l.c.). Asia Minor (ECH 1922, p. 35). The Caucasus (CHD 1846, p. 126; SDR and LDR 1878, p. 69). Kirgizia and western Turkestan (HEY 1880–1881, p. 27). Siberia (among others, SBJ 1880, p. 37; RM!), east as far as Trans-Baikal (HEY l.c.). Northern Mongolia (JEN, MO!). Pamir (HEY 1896, p. 12).

### Ecology

An extremely eurytopic species; its most important requirement is sufficient exposure to sun, and hence it occurs only on more or less open terrain. The soil composition is apparently of little consequence, although the species maximum abundance is greatest on sandy or gravel-mixed soil. Meadow vegetation, sometimes very tall and dense, is preferred; the driest, more or less barren fields, as well as very swampy terrain are avoided. Thus, on the basis of humidity requirement, the species may be designated “mesophilic”. Cultivated soil has a favorable effect on the species, especially in the north, and the insect appears synanthropic to a great extent. In the fields it extends to the lower  
 324 parts of the *reg. alp.* throughout Fennoscandia (see SIE 1863, p. 119; SPS 1879b, p. 19; 1888–1889, p. 114; JNS 1926, pp. 900 ff.; BRD 1934, p. 234); in Tol, where it ascends to an altitude of 900 m above sea level, it is particularly characteristic of *Trollius* meadows (BRD 1934, p. 89). On the tundra, only on the Kola Peninsula (PPP 1905, p. 93); on the other hand, not found farther east (see, for instance, PPP 1909, p. 9; 1910a, p. 336).

### Biology

Southern Swedish catches: II: 1; III: 5; IV: 23; V: 49; VI: 99; VII: 88; VIII: 60; IX: 20; X: 10; XI: 1. Immature beetles very numerous in southern Sweden between June 12 (Vrm) and July 31 (Gtl), in northern Sweden from July 5 (Mdp) to August 23 (Lul). In Denmark, where the maximum abundance occurs in August, numerous larvae have been observed from the end of March to the beginning of June. LRS (1939, pp. 328, 389) is certainly correct in concluding that autumn breeding and larval hibernation are normal. Nevertheless the number of surviving adults is quite high and, furthermore, the times of hatching (see above) quite late; hence the impression is gotten that this species must also reproduce in spring at least in the north. Perhaps in that region the development spans two years. The beetle diet reportedly is partly vegetarian—melon and fungi (BLK 1925, p. 33), and flowers of *Galium verum* (LTH 1931, p. 174). The larva is predominantly carnivorous, as PME (in litt.) has demonstrated in breeding experiments (see also BLK l.c.), and so might



be the adult; the latter was observed in the act of consuming an opilionid (Skå Dalby, August 4, 1929, FRL).

### Dynamics

Wing dimorphism evident. I have seen only one intermediate specimen (Skå Höllviken, August 1936) in which wings appeared gigantic. In brachypterous specimens the slender rudiment constitutes about half the length of an elytron and lacks the reflexed apical part. Macropterous individuals are certainly capable of flight, although there is no corroborative data. It is significant, however, that of the 19 specimens found in sea drift in southwestern Finland, 18 belonged to the otherwise rare macropterous form (PME 1944, p. 146).

### Variation

- 325 Coloration highly variable (see SZM 1937). Dark forms have been described under various species names (*alpinus* Dej., *nubigena* Hal., *sibiricus* Gebl., *tarsalis* J. Sahlb.), and in our region exhibit a marked geographic distribution; they are characteristic primarily of western Norway and the fjeld regions. Mapping their distribution, keeping in mind the climatic factors (as well as chance weather conditions; LTH 1931, p. 381) would certainly be very interesting. In my opinion the melanism of this species is certainly dependent on atmospheric humidity.

### \**Calathus micropterus* Dft.

#### Distribution

*Sweden*: Distributed throughout the country, except for the alpine region. The very large number of localities in certain parts of southern Sweden are the result of the intense investigation conducted by LOH on the forest-soil fauna of that region. In reality the species is certainly quite uniformly distributed. The northernmost localities lie in Tol, in the Abisko region (several collectors!) and near Karesuando (LBÅ!).

*Norway*: Continuously distributed throughout the country without recognizable gaps except in the northernmost peninsulas and the actual high fjelds. But in the western part of the country the species is rare; it has been recorded, for instance by MST from 7 Bergen, but was still not known from this region to SPS (1875, 1901). Northernmost localities: 38 Alta, several localities (several collectors); Lakselv in Porsanger (several collectors); 40 Tana (SPS, according to STA).

*Finland*: Absent in the high fjelds, but otherwise distributed throughout the country and certainly without gaps. Its absence in parts of Ob is definitely only apparent. Also found on the Arctic Ocean coast: Lp Trifona (STÅ!).

Doubtful: Lp Fischer Peninsula (PPP 1905, p. 93; see "Russian sector" below).

*Russian sector:* In the western and southern parts of Kola Peninsula (PPP 1905, p. 93), east as far as Lj Ponoj (SBJ, MTL, MH!). Certainly occurs throughout Karelia but to date only two localities known in the central and northern parts due to insufficient investigation.

Doubtful: PPP (1905, p. 93) mentions three localities from the northern  
326 coast of the Kola Peninsula (in addition to the Fischer Peninsula on the Finnish coast on the Arctic Ocean). Voucher specimens absent, at least in the Finnish collections, and it is possible that a confusion with dark individuals of *melanocephalus* has occurred.

*Adjacent regions:* In the wooded parts of Denmark (including Bornholm) widely distributed and not rare (West 1940, p. 41). Estonia, including Ösel (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 368), also Ireland (JHS and HLB 1902, p. 576).

*Total area:* Palearctic species. In Europe south as far as eastern France (DEV 1935, p. 55), northern Italy (LUI 1929, p. 128), and Bosnia (APF 1904, p. 286). In the northeast as far as Pechora (SBJ 1898, p. 339). The Caucasus (according to CKI 1927–1933, p. 784). Siberia (among others, SBJ 1880, p. 37; RM!), east as far as Trans-Baikal (HEY 1880–1881, p. 27).

### Ecology

In contrast to the other species of *Calathus* (except *piceus*), this is a shade-loving forest species, completely absent in open terrain. It prefers deciduous and mixed forests, but at the same time does not avoid solely coniferous forest stands. The soil must contain a rich layer of humus and at least moderate moisture. Vegetation plays a subordinate role; the species multiplies as well in the southern Swedish beech forests, where the ground is almost barren during summer, as in humid, moss-rich spruce forests. The optimum seems to be attained in *Vaccinium-myrtillus*-rich mixed forests. During the day the insect lives under leaf litter, moss, bark of tree stumps, etc. Regular successive species: *Notiophilus biguttatus*, *Pterostichus oblongopunctatus*, *Xantholinus tricolor* Fbr., and several others. In Finland also found in large numbers in forest bogs (RNK 1938, p. 68). In the fjelds the timber line is obviously not crossed (for doubtful records from the northern part of the Kola Peninsula, see above), but in the *reg. bet.* the species is frequently found in large numbers (e.g., in the Abisko region; BRD 1934, p. 234). All Central European records confirm the species as a true forest animal.

### Biology

Southern Swedish catches: II: 1; III: 4; IV: 42; V: 58; VI: 140; VII: 78; VIII: 65;

IX: 60; X: 16; XI: 3; XII: 3. In Denmark too the beetles are fairly uniformly distributed throughout summer, and larvae have been observed in every month except August (LRS 1939, p. 328). LRS (l.c., p. 390) considers the species an autumn breeder with the qualification that breeding may take place "to a lesser extent" in spring. This, however, is certainly the normal pattern, at least in southern Sweden, which is supported primarily by the observation of numerous freshly emerged beetles in August and September, from August 5 (Skå) to September 18 (Vgl). Only in northern Sweden (Asl) was an immature beetle recorded for August 22, but here again such beetles are found right up to September (September 3, Nbt).

### Dynamics

The species is constantly brachypterous, and the contention of RYE (1908, p. 119) that it is dimorphic is certainly due to confusion with *mollis*. The wing rudiment does not attain even half the length of an elytron, and hence the insect is flightless.

### Fossil Records

Finland (lk), postglacial (PPP 1911, p. 38). Faeroe Islands, undetermined age (JSS and RSS 1922, p. 13).

### \**Calathus mollis* Mrsh.

#### Distribution

(map in LTH 1939a, p. 259)

*Sweden*: Only in the southeast, where it is widely distributed, apparently without gaps. In Skå, Ble, on Öld, and Gtl numerous localities; additional localities: Hll Skummeslöv, 1939, 1 specimen (TJB!); Mellbystrand, 1934, 2 specimens (ROS, ML!); Särödal, 1937, 1 specimen (LBL, RM!). Små Markaryd, 1936, numerous (LTH); Strömsnäsbruk, 1936, numerous (LTH); Södra-Unnaryd, 1940, locally frequent (LTH); Ljungby, 1936, 4 specimens (LTH); Ryssby, 1923, 1 specimen (GTZ!); Virestad, 1938, 1 specimen (BRC, E.T. 1931, p. 189, "*nubigena*"!); Älmehöda, 1924 (BRD, ML!); Brittatorp, 1943 (Magnusson!); Vassmolösa, 1929, 4 specimens (GTZ!); Kalmar (WLN, LG!), 1939 (WSL!); Öster-Korsberga, 1920, 1 specimen (Pontén, coll. GTZ!); Lemnhult, Högatorp, 1929, 1 specimen (GTZ!); Myresjö, 1923, 1 specimen (GTZ!); Rosenfors, probably around 1910 (ERC, 2 specimens, MG!); Sandbäckshult, 1942 (Palm); Fliseryd, 1918, 1932 (WLE!); Västervik, Vålningebo, July 6, 1939, 2 specimens (LBL, RM!). Northernmost locality Gtl Sandön, at least 5 specimens (JNS! LOH!).

328 *Doubtful*: Göteborg, Arendal, 2 old specimens (Malm, MG!). Not represented in the large collections of any other coleopterist of Göteborg (SDN,



ERC, and others).

*Norway:* Exclusively in the southwest on the coast: 5 Lister (JEN, HMB); 6 Kvalbein and Kvasheim in Jæren, just next to the sea, 8 specimens in all (HLS 1910, p. 5; 1915, p. 22).

Absent in eastern Fennoscandia.

*Adjacent regions:* In Denmark continuously distributed along the western coast of Jylland; in addition, one locality each in the southeast and the inland; on the islands found on Bornholm and at one locality each on Falster and Fyn; on Sjaëlland the species is surprisingly absent (West 1940, p. 41). In Estonia two localities in the Dorpat region (det. RTT; RHL 1921, p. 55). Not known from Latvia and the Leningrad region; on the other hand, found in northern Poland (OGI 1931, p. 31). British Isles (Joy 1932, p. 368), also frequent on Ireland (JHS and HLB 1902, p. 576). Shetland (West 1930, p. 75).

*Total area:* Western Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 194), Corsica (DEV 1935, p. 55), southern Italy, Sardinia, Sicily, Malta (LUI 1929, p. 128), Greece (APF 1904, p. 285; SZM 1937, p. 38). East as far as Slovakia (ROU 1930, p. 183), Transylvania (PTI 1912, p. 37), and Russia, Kiev (JAC 1905–1908, p. 326). According to HOR (1941, p. 305) there are two different races in Germany—a western race north as far as the Frisian Islands and Helgoland, and a southeastern race, which has also reached the Baltic Sea coast on a broad front. Northern Africa (BED 1895–1914, p. 207; SZM l.c.). Asia Minor (APF l.c.; SZM l.c.). Syria and Palestine (SZM l.c.). The Caucasus (JAC l.c.). Western Turkestan (HEY 1896, p. 12).

### Ecology

Compared with the closely related species *melanocephalus*, this species is far more xerophilous, and is primarily restricted to more or less sandy soil. It is therefore fond of living on the coasts, but not on more or less barren sand dunes; instead it is found in dry meadow-type vegetation such as *Galium verum*, *Thymus serpyllum*, dry grasses, and similar plants, and also on fallow land with *Artemisia campestris*, *Anthemis arvensis*, etc. It does not tolerate shade. In the rest of Europe the species seems to be much more coastal than in our region (see West 1940, p. 41; RTT 1908, p. 136; SRN 1926, p. 28; JEA 1941–1942, p. 845; FWL 1887, p. 82). Its dependence on sand has always been emphasized (see S.E.Z. 1915, p. 213; GRH 1910, p. 29; HOR 1941, p. 105; E.M.M. 1935, p. 66).

### Biology

Swedish catches: II: 2; III: 2; IV: 7; V: 8; VI: 21; VII: 38; VIII: 30; IX: 8. According to LRS (1939, pp. 328, 389) it is a spring breeder in Denmark and hibernates only to a small extent as an adult. This is certainly the case in



Sweden also; the single immature beetle (Gtl) seen by me was collected on June 11.

### Dynamics

Wing dimorphism evident (LTH 1939a, p. 259). In brachypterous specimens the narrow acuminate wing rudiment is less than half as long as the elytron. Macropterous individuals have fully developed wings and are certainly capable of flight. I have, however, made many attempts (Små, July) to induce flight by exposure to the sun, warming up, etc., but in vain.

### Variation

In the Mediterranean region in particular the species shows considerable variability (SZM 1937). On the western coast of Europe it is more or less dark (*forma typica*), often colored almost like *micropterus*, as also in Jylland and Norway. Farther east (in Sweden among others) paler in color, especially the prothorax, which is usually uniformly reddish-yellow ("var. *erythroderus* Gaut."). The parameres too seem to exhibit a certain variability (LTH 1943a, p. 53).

\**Calathus piceus* Mrsh.  
(*rotundicollis* Dej.)

### Distribution

(map in DEV 1921, p. 419; 1930b, p. 120)

*Sweden*: Exclusively in Skå, and found only in the west except for one locality: Nosaby, June 1905 (ROS, 2 specimens, ML!). The classical locality is Pålsjö near Hälsingborg, first discovered by VNS, where the species has been collected many times and by numerous collectors at least since 1887, and from other places in the same region. Bökeberg, August 2, 1942, 1 specimen (CHR); Södra-Sandby, October 20, 1939, 1 specimen (Asta Sjölin, coll. CHR); Lomma (ADR, coll. SJB); Röstånga, June 1935, 1 specimen (FHH, coll. LTH); Båstad, at the outskirts toward Hll, July 1935, 1 specimen (B. Velander, coll. BRK!).

330 Erroneous: Vgl Svenljunga (ÖST, 1 specimen, MG!). The labeling by ÖST is not at all reliable (see *Chlaenius vestitus* and *Harpalus neglectus*).

Absent in the rest of Fennoscandia. The record from Finland (GLL 1896) is erroneous.

*Adjacent regions*: In Denmark rather widely distributed but not frequent; apparently absent on Bornholm as well as in large parts of western Jylland (West 1940, p. 42). Not found in the Baltic States and the Leningrad region. British Isles (Joy 1932, p. 368), also frequent on Ireland (JHS and HLB 1902, p. 576).

*Total area:* Solely European species. Predominantly western, for example, in Germany only in the northwest, east as far as Oder (HOR 1941, p. 307). South as far as southern Spain and Portugal (FUE 1920, p. 195). Also found in northern and southern Italy (LUI 1929, p. 129), and isolated in southern Greece (APF 1904, p. 286).

### Ecology

Apparently as much of a forest species as *micropterus*, but lives in sparse forest stands and, apparently, only deciduous forests (West 1940, p. 42; SRN 1926, p. 28; E.B. 1927, p. 94; GRD 1937, p. 42); purportedly also in fields far away from the forest (BRN, according to HOR 1941, p. 307). Regarding its occurrence at the sea, see below. Sandy, loamy-sandy or loamy soil recorded (BRN and PTZ 1933, p. 233; HOR l.c.; FWL 1887, p. 83). The few observations in Sweden also give the impression of an exclusive forest species, found, for example, near Hälsingborg (but here not exclusively) in a beech forest.

### Biology

The few Swedish catches are distributed as follows: V: 4; VI: 2; VII: 4; VIII: 6; IX: 5; X: 1. In Denmark, rich in material, maximum abundance in August and September very distinct (LRS 1939, p. 328); in Germany too more prevalent in the autumn months (E.B. 1927, p. 94). It is an autumn breeder, hibernating in the larval stage; many adults also survive to the following spring, which, however, do not reproduce (LRS l.c., p. 389).

### Dynamics

- 331 Wing dimorphism possible. In France it is described as "aptère" (JEA 1941–1942, p. 843), whereas in Holland macropterous specimens also occur (EVS 1922, p. 25). The seven Swedish specimens studied by me possess fully developed wings; in Denmark and Hamburg I likewise saw only winged specimens. The appearance in large numbers ("hundreds") along the Baltic Sea in Mecklenburg (NBG, E.B. 1937, p. 379) decidedly indicates flight capacity. In Germany the species is presently advancing eastward (HOR, E.B. 1938, p. 130).

\**Calosoma auropunctatum* Hbst.  
(*sericeum* Fbr.)

Distribution  
(map in JEA 1940, p. 58)

*Sweden:* Occurrence quite sporadic and hence one cannot say whether the

species is actually a permanent resident. Skå Ilstorp (Roth, according to THS 1859, p. 12); additionally, in coll. WRN there is one specimen labeled "Skåne, ex coll. Juel". Hil (BOH, RM! FHR, VA!, July 1869, coll. Roth, ML!); Brogård in Skrea on sandy soil, about 1.0 km from the sea, August (FGQ, E.T. 1922, p. 192!); Stavsinge, Arvidstorp (RGS, E.T. 1913, p. 231, coll. LTH; also, 1 specimen, "Falkenberg," RGS, MG!); Särö, seashore, 1 specimen during the 1830's (WRG, MH!). Old (many specimens collected by STH and other earlier entomologists; RM! MG! ML! VA!), Bredsätra, June 1937 (BRK).

*Norway:* Only 1 specimen known: 2 Oslo, Töien, May 18, 1910 (N.E.T. 1927, p. 214).

*Finland and Russian sector:* Absent.

*Adjacent regions:* In Denmark rare and extremely local, but sometimes found in larger numbers, especially in Jylland; only three localities on the islands, not found on Bornholm (West 1940, p. 5). Estonia (HAB in litt.); Latvia (SDL 1872, 1891; ULN 1884). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area:* Western Palearctic species. In Europe predominantly an eastern species (for instance, not found in most of western Germany; HOR 1941, p. 65), south through Holland and Belgium (EVS 1898, p. 38) as far as central France (DEV 1935, p. 16), northern Italy (LUI 1929, p. 30), and Greece (OTZ 1886, p. 204). East as far as Volga (BRU 1927, p. 213) and Astrachan' (JEA 1940, p. 112). Asia Minor; Syria; Iran (JEA l.c.). The Caucasus (CHD 1846, p. 105). Turkmenia and western Turkestan (HEY 1880–1881, p. 12; JEA l.c.). Kashmir and eastern Turkestan (JEA l.c.).

## Ecology

Our records have been made in the immediate vicinity of the sea with one exception (Skå Ilstorp). Also in Denmark and northern Germany quite predominantly at the coast (SDT 1841, p. 310; West 1940, p. 5; S.E.Z. 1868, p. 49; 1891, p. 78; 1915, p. 209; GRD 1937, p. 78); farther south, inland. It appears to require sandy soil (LTZ 1847–1852, p. 97; RTT 1908, p. 78; HOR 1941, p. 65) and often occurs in fields and other cultivated land (W.E.Z. 1908, p. 289; JNN 1905, p. 186; Rapp 1933, p. 6; DTZ 1936, p. 47). It is definitely a ground insect and does not climb trees (BRG and CLL 1917).

## Biology

In Denmark, where there is rich material, most of the adults have been caught in June and August. It is a spring breeder, hibernating as an adult (LRS 1939, pp. 316, 357). The beetles may live for at least three years in captivity (BRG and CLL 1917). Larvae and beetles feed on larvae of bombycids and noctuids

(JNN 1905, p. 186; BRG and CLL 1917; Rapp 1933, p. 6), and purportedly of other insects also (BUR 1939, p. 28).

### Dynamics

The insect has fully developed wings and is certainly an excellent flier. Flight observations recorded in Germany (DTZ 1936, p. 47) and France (CAI 1908, p. 19).

### Systematics

According to JEA (1940) *auropunctatum* is a separate species and not a subspecies of *maderae* Fbr. (as stated by BRU 1927).

### Variation

In western and northern Europe rather homogeneous (*forma typica*); in the eastern Balkans and farther east, two subspecies are known (JEA l.c.) in addition to *forma typica*.

### Fossil Records ?

According to JEA (1940, p. 111) the Miocene remains from Sweden, described as two fossil species, probably belong to *auropunctatum*.

333

### *Calosoma denticolle* Gebl.

#### Distribution

(maps in BRU 1927, p. 232<sup>20</sup>; JEA 1940, p. 59)

*Finland*: Only one specimen, on the seashore in Brännskär in Nl Tvärminne skärgård, August 30, 1935, after a severe storm (STÅ, N.E. 1936, p. 129; Frey 1937, pp. 421, 423, 425, 436; MH!).

Absent in the rest of Fennoscandia, and its adjacent countries.

*Total area*: Palearctic species. In Europe an exclusively eastern species, through Russia west as far as Poltava and Ryazan' (southeast of Moscow) (SEM 1898, p. 71), north as far as Kazan (LEB, *Horae Soc. Ent. Ross.* 1905, p. 357); south as far as Dobruja and the European part of Turkey (BRU 1927, p. 230; JEA 1940, p. 120). The Caucasus (BRU l.c.; LSH 1936, p. 138). Kirgizia (HEY 1880–1881, p. 12). Western Turkestan (JEA l.c.). Southern Siberia, east as far as Trans-Baikal (MDL 1931, p. 3), north as far as Tomsk (JAC 1905–1908, p. 255).

<sup>20</sup>See footnote under *C. investigator*.



## Ecology and Biology

I could find no references in literature to the mode of life of this species.

## Dynamics

Wings fully developed, also in the Finnish specimens (see Frey 1937, p. 423). Spontaneous flight observed in the Caucasus (LSH 1936, p. 138).

*\*Calosoma inquisitor* L.

## Distribution

(map in BRU 1927, p. 178)

*Sweden*: Actually native, but occurs sporadically, so that the map in no way reflects the present-day distribution. Found only in the plains and hence missing in the southern Swedish highland. In Skå, Ble, Hll, as well as the Göteborg region rather widely distributed and collected many times. Additionally, these localities: Små Kalmar, June 1908 (NST, coll. LTH); Strömsrum, June 24, 1942 (JNS); Långemåla, July 3, 1918 (WLE, E.T. 1925, p. 237). Öld Ottenby (KHK!), June 20, 1928 (LOH!); Långlöt, Ismantorp, June 1936 (BRK); Stora-Rör region (several collectors!). Vgl Kinnekulle (MRT 1873, p. 9; MG!). Boh 334 (leg.?, coll. GLL!), Bullaren, fragment (LTH). Ögl Åtvidaberg, June 10, 1939 (BUT, coll. LTH); Bjärka-Säby, May 18, 1942 (LNM!); Opphem (WRN); Tåkern, June 1913 (LBL, RM!); Västra-Ny, 1852 (HGN 1853, p. 16). Sdm Nacka, June 1902 (BSH, MS!), June 12, 1922 (V. Smidt, coll. LTH). Stockholm (numerous collectors!) occurring in large numbers in the parks of Karlberg (PAY 1798, p. 128), Drottningholm (SND, E.T. 1882, p. 5), and Haga (1943, several collectors). Upl Runmarö (HFS, LÖ!); Värmdö (Y. Ahlström, coll. SJB), Lännersta (P. Geijer!); Uppsala, Vreta, near Ekoln, appearing in large numbers, August 1898 (KHK!). Vst (leg.?, LF), probably Västerås region (JHN, 2 specimens, MU!).

*Norway*: Only four localities on the southern coast: 1 Halden (SIE 1875, p. 80; N.E.T. 1927, p. 214), in large numbers near Röd, June 5, 1865 (CTT 1868, p. 46), later by HSS, June 1904, numerous, June 1905, several specimens; May 20, 1912, 1 specimen; later searched for in vain. 2 Oslo, Töien, 1848 (MOE, according to SIE l.c.; N.E.T., l.c.). 4 Nes-Verk, 1875, 1 specimen (SHY 1879, p. 12). 5 Vennesla, 1911 (according to MST).

*Finland*: Exclusively in the extreme southwest, where the species is known from olden times (Uddman 1753, p. 26; see HJT 1896, p. 124): Al Runsala; Ispois; St. Karins; St. Marie; all near Åbo (SBJ 1873, p. 61; several collectors!). NI Tvärminne, 1912, 1 specimen (GBL).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed and not rare; however,

not found to date on Bornholm (West 1940, p. 5). In Estonia rather widely distributed, also on Ösel and near Reval on the northern coast (SDL 1872; HAB in litt.); Latvia (SDL 1872; ULN 1884; LBÅ 1932). Leningrad region (BSK 1929, p. 143). British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 558).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 20), Corsica (DEV 1935, p. 16), southern Italy (LUI 1929, p. 29), Sardinia and Sicily (JEA 1940, p. 86), Greece (OTZ 1886, p. 204), and Crete (BRU 1927, p. 169). East as far as Bulgaria (APF 1904, p. 16), Galicia (LMN 1893, p. 337), in Russia as far as Kazan and Saratov (JAC 1905–1908, p. 255). Northern Africa (BED 1895–1914, p. 19; JEA l.c.). Asia Minor; Iran; the Caucasus (BRU l.c.; JEA l.c.; BOD 1927a, p. 65; 1927c, p. 89). Apparently isolated in eastern Siberia and Japan (BRU l.c.; JEA l.c.).

### Ecology

This species lives in sparse deciduous forest stands. It seems to be almost restricted to oak; there are only a few observations from other trees: beech (Skå Hälsingborg, 2 specimens; JNN 1905, p. 189), fruit trees (RSH 1842, p. 6), *Crataegus* (Rapp 1933, p. 5). The insect climbs trees with great agility. The discontinuous occurrence of this species is striking; during the years of tortricid† abundance it may suddenly appear in large numbers at places where it has neither been observed before or after.

### Biology

Swedish catches: V: 9; VI: 36; VII: 3; VIII: 2. In Denmark the maximum abundance in June is likewise pronounced and numerous larvae have been caught in June and July (LRS 1939, p. 316). Hibernation occurs exclusively as adults (LRS l.c., p. 356). Its most important prey, at least for the adult, is *Tortrix viridana* L. (E.B. 1926, p. 139; RSK 1926, p. 214; numerous observations in Sweden; geometrid larvae also attacked (Vgl Pixbo, LTH; BUR 1939, p. 27). The larvae do not climb trees. The beetle apparently lives for at least three years (BRG and CLL 1917).

### Dynamics

The insect has fully developed wings and is certainly an excellent flier. However, only two direct flight observations were found in literature (E.B. 1919, p. 245; JHS and HLB 1902, p. 558). Individuals that have strayed in flight have been collected (S.E.Z. 1891, p. 79; BRN 1937, p. 31).

†(Tortricidae, Lepidoptera; suppl. scient. edit.).

## Variation

In Europe only color aberrations known. On the other hand, in Iran, the Caucasus, and eastern Asia there are well-defined subspecies (JEA 1940).

## Fossil Records

Skå, postglacial (HNR 1933, p. 123). According to JEA (1940) from the Miocene in southern Germany, Provence, and Switzerland.

## *Calosoma investigator* Ill.

### Distribution

(map in BRU 1927, p. 232<sup>21</sup>)

*Sweden*: Only one specimen known, labeled "Öland, Mortonson" (MG!) and certainly originating from Stora-Rör region (LTH, E.T. 1928, p. 216).

336 Absent in the rest of Fennoscandia and all the adjacent regions. The closest localities lie in the eastern Prussia where, however, the species has not been rediscovered during this century (HOR 1941, p. 64).

*Total area*: Palearctic species. In Europe constantly found only in Russia, west as far as Podolia (LMN 1913, p. 52), north at least as far as Yaroslav (SEM 1898, p. 79). The Caucasus (SDR and LDR 1878, p. 63). Trans-Caspian region (JEA 1940, p. 122). Siberia (SBJ 1880, p. 7; PPP 1906b, p. 15; 1907d, p. 3), north as far as about latitude 63° N, east as far as Amur; northern Mongolia (BRU 1927, p. 231; JEA l.c.).

## Ecology

No information available in literature concerning the mode of life of this species. However, like *auropunctatum*, it is certainly a ground insect; I do not know the source for BUR's (1939, p. 28) contention: "in forests on trees".

## Biology

Cycle of development not known.

## Dynamics

Wings fully developed. The insect has certainly flight capacity but there is no corroborative data. The sporadic records in Germany (HOR 1941, p. 64) and the single specimen on Öld are certainly individuals that strayed in flight.

<sup>21</sup>In the map by BRU 1927 the distribution of *investigator* and *denticolle* has evidently been confused.

\**Calosoma reticulatum* Fbr.

Distribution

(incomplete map in BRU 1928a, p. 119)

*Sweden:* This species seems to be a permanent resident only of Öland: between Ottenby and Gräsgård (ÖST, MG!); Stenåsa-Alvar†, fragment (GRZ!); Mörbylånga-Alvar, August 18, 1930, 2 specimens (ADR, ML!); Vickelby-Alvar, June 8, 1925, 2 specimens (ERL, E.T. 1928, p. 50!), June 16, 1928, 2 specimens, June 7, 1937, 1 specimen (BEN, ML!); Resmo-Alvar, May 12, 1937, 2 specimens (Palm!); Böda, 1907 (C. Hallquist, E.T. 1908, p. 47; ML!). On the mainland only two localities: Skå Trolle-Ljungby (GAD, E.T. 1883, p. 38; 1908, p. 47. In coll. WRN, 1 specimen labeled "Skåne, ex coll. Juel," which  
337 probably represents the voucher specimen collected by GAD). Boh Foss, Torreyby, 2 specimens in different years around 1926, along with a fragment of a third specimen (NOT; coll. OLS! coll. LTH).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark very rare and found only in Jylland, where there are several localities in the southwest (West 1920, p. 5). Absent in the other adjacent regions.

*Total area:* Palearctic species. In Europe predominantly an eastern species, occurring sporadically as far as northwestern Germany (HOR 1941, p. 66), Holland, 1 specimen (EVS 1922, p. 650 c), Belgium, 1 specimen (BRU 1928a, p. 83). South as far as northern Austria (HOR l.c.), Slovakia (ROU 1930, p. 102), Hungary (BRU l.c.; MG!). In southern Russia east as far as Orenburg (BRU 1928b, p. 97). Western Siberia (JEA 1940, p. 185).

Ecology

Definitely a xerophilous species that lives particularly on sandy soil, often near the coast, partly in open heaths and partly in sparse pine forest (D.E.Z. 1907, p. 154; HOR 1941, p. 66); reportedly, but probably more or less accidentally; also in fields (RTT 1908, p. 78). On Öld it lives on dry, completely open "Alvar†". The discoverer (NOT) and I visited the very interesting isolated locality in Boh in July 1944. It is a steep southern slope situated about 200 m away from the fjord bank, which is partly bound by a vertical rocky slope and partly by a fairly dense mixed beech forest. The soil consists of stony, somewhat loamy sand. The growth of numerous fresh spruce and *Alnus glutinosa* had considerably transformed the biotope in recent years, but

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



decaying stumps of these species of trees proved that earlier too there had been shade in at least some places. The vegetation was extremely heterogeneous, very sparse at the driest places, and included, for example: *Hieracium pilosella*, *Fragaria vesca*, *Campanula rotundifolia*, *Brunella vulgaris*, *Potentilla erecta*, *Deschampsia flexuosa*; stunted *Calluna* at places; and extensive bushes of *Rubus "fruticosus"*. The carabid fauna reflected the dry meadow type, and only *Calathus fuscipes* has a southern distribution. Nevertheless we are certainly concerned here with a heat locality; situated on the narrow Gullmar Fjord, which is precisely north-south oriented, this is one of the very small places with a southern exposure. *C. reticulatum* is a ground insect that climbs only rarely.

### Biology

The very few specimens from Sweden and Denmark (LRS 1939, p. 316) were caught from May to August, but more than half (12 out of 19) were collected in June. It might be a spring breeder, hibernating exclusively as an adult (l.c., p. 357). In captivity the beetles and larvae feed on bombycid larvae (BRG and CLL 1917); they have been observed in nature attacking *Saturnia* larvae (BUR 1939, p. 28). The beetle can live three years in captivity (BRG and CLL 1917).

### Dynamics

Wings fully developed and certainly functional, but no flight observations available.

### *\*Calosoma sycophanta* L.

#### Distribution

(map in BRU 1927, p. 178; LTH 1942b, p. 3)

*Sweden*: Extremely rare and sporadic in occurrence. Skå Stenshuvud (MLG 1863, p. 4; no voucher specimen); Trollenäs (coll. THS, ML!); Trolleholm, August 9, 1933 (Cl. Malm, ML!); Valjö (WLG 1866, p. 5; no voucher specimen); Båstad, 1896 (S.A. Lovén, verbal communication). Ble Karlskrona region (ANK, according to GAD, E.T. 1881, p. 211; no voucher specimen). Små Kalmar (AHT, 2 specimens, VA!). Öld (BOH, 2 specimens, RM! 1 specimen, MG! FHR, 1 specimen, leg.? 1 specimen, VA!), Ottenby (BOH, according to THS 1859, p. 12. According to a verbal communication from TGR also collected there by AHT). Vgl Pixbo, close to Göteborg (ÖST, MG!)<sup>22</sup>; Fårdalaberget, August (GAD, E.T. 1881, p. 211). Quite isolated: Dlr Korsnäs,

<sup>22</sup>Regarding the reliability of the record by ÖST, see LTH 1942b.

July 7, 1943, male (L. Norberg, ML!).

No records from the rest of Fennoscandia.

*Adjacent regions:* In Denmark likewise found singly, but rather widely distributed, also on Bornholm and northern Jylland (West 1940, p. 5). Estonia (HAB in litt.); eastern Latvia (ULN 1884). Not known in Leningrad region to the best of my knowledge. On the British Isles occurs only accidentally (Joy 1932, p. 325; JHS and HLB 1902, p. 558).

*Total area:* Palearctic species (introduced in North America). In Europe south as far as southern Spain (FUE 1918, p. 20), the Balearic Islands (JEA 1940, p. 82), Corsica (DEV 1935, p. 16), southern Italy, Sardinia, Sicily (LUI 1929, p. 30), Greece (OTZ 1886, p. 204), Crete (JEA l.c.). In the northeast as far as Moscow and Kazan (JAC 1905–1908, p. 225). Northern Africa (BED 1895–1914, p. 19). Asia Minor and Cyprus (BRU 1927, p. 174). Iran (JEA l.c.). The Caucasus (CHD 1846, p. 105). Western Turkestan (HEY 1898, p. 3; BRU l.c.). Western Siberia, as far as Tomsk (HEY 1880–1881, p. 12; JEA l.c.).

### Ecology

In Central Europe, where the species is actually native, it seems to be a rather ubiquitous forest dweller, climbing all kinds of trees (including conifers) in search of larvae. Hence, unlike *inquisitor*, it does not prefer a definite species of tree or a definite type of forest (see Rapp 1933, p. 6; BUR 1939, p. 28) and also has a greater variety of prey (see below). Both adults and larvae are excellent climbers (BRG and CLL 1917). In Sweden frequent only once (Öld Ottenby) and found in an orchard.

### Biology

Breeding takes place in early summer and hibernation exclusively in the adult stage. The insect has lived four years in captivity (BRG and CLL 1917). Its prey includes primarily various bombycid larvae, e.g., *Lymantria monacha* L. (among others, S.E.Z. 1848, p. 264) and *dispar* L. (BRG and CLL 1917), *Thaumetopoea processionis* L. (among others, GAL 1886, p. 279); and *Melolontha* (JNN 1905, p. 190; TRP 1929–1930, p. 250). Its feeding on cherries (DTZ 1936, p. 47) no doubt occurred due to thirst.

### Dynamics

The insect is fully winged and an excellent flier; various records of flight from other countries (*Korr.-Bl. Ent. Ver. Halle*, 1886, p. 6; EVS 1898, p. 38; *Bull. U.S. Dept. Agric.*, 251, 1915; E.B. 1919, p. 246; BRU 1927, p. 172). The length of flight is indicated, for example, by the accidental records for the southern coast of England and in the open sea (E.M.M. 1919, p. 180; 1926, p. 168).

The Swedish records might generally represent the consequence of accidental immigration without permanent colonization (LTH 1942b).

### Variation

The species is homogeneous. There are only color variations, which nevertheless in Asia show a definite geographic constancy (JEA 1940).

### Fossil Records

Vgl and Dsl, postglacial (LTH 1942b). Galicia, glacial (SCL 1916, p. 43). JEA (1940, pp. 31, 82) suggests that "*C. agassizi*" from the Miocene also belongs here.

#### *\*Carabus arvensis* Hbst.

(*arcensis* Hbst., according to BUR 1939)

#### Distribution

(map in BRU 1932-1936, pl. 7)

*Sweden*: Predominantly southern and rare almost everywhere. However, the area seems to be continuous. In Skå the species is absent in the south and east, and the southernmost localities are: Lund (several collectors!); Södra-Sandby, June 1865, June 1866 (MLF, MG!). The occurrence on Öld has not been unimpeachably established, since there is only one old specimen (BOH, RM!) without further locality data; on Gtl the species is absent. Northernmost localities of the continuous area are: Vrm Vitsand, Prästtjärn, July 12, 1934 (LBL, RM!); Dlr Leksand (SPB!); Falun (KRZ and SLV, according to KLF); Smedjebacken, Uvberget, September 3, 1941 (OTT!); Hls Hornslandet, Mycklamyra, several specimens (THS 1868, p. 289. This record might not be dubious since in RM there are three specimens from Hls, one of which is labeled "Ströhm").

341 Doubtful: Sdl Nacka (NBL 1840, p. 203. Otherwise found nowhere in the Stockholm region).

*Norway*: Only in the south on the coast and the nearest inland, sparsely but apparently continuously distributed as far as 6 Haugesund (N.E.T. 1926, (p. 70). Northernmost localities: 16 Saude; 15 Kongsberg, two localities; 2 Oslo region, several localities (SIE 1875, p. 78; SHY 1879, p. 11); 10, three localities along the Glommen River, north as far as Hoff in Solör (SHY l.c.). All according to N.E.T. 1926 (p. 70).

*Finland*: Only in the south, especially in the southeast. In the Isthmus of Karelia not rare, toward the west as far as Ab Vichtis (N.E. 1934, p. 39); Ta Loppi (LNN); Hattula (WEG). In the inland, north as far as Tb Jyväskylä (JRV, MH!); Sa Rukolahti (WEG); Kl Saari (PHJ).

341 Doubtful: St Björneborg (Helle, MH! According to HLL, in litt., not very reliable).

*Russian sector:* Only near Sv Gumbaritsa, 1943 (PFF).

*Adjacent regions:* In Denmark mainly in Jylland, where the species is moderately distributed and not rare at places; on the islands (including Bornholm) rare (West 1940, p. 3). Estonia (SDL 1872); Latvia (SDL 1872; HEY 1903; LCK and MIK 1939). Leningrad region (OBT 1876; BRU 1932–1936, p. 393). British Isles (Joy 1932, p. 324), also Ireland (JHS and HLB 1902, p. 558).

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 18), northern Italy (LUI 1929, p. 39), Yugoslavia (APF 1904, p. 36), Rumania and southern Russia (BRU 1932–1936, p. 400). In the north-east as far as Pechora (SBJ 1898, “*conciliator*”). The Caucasus (JEA 1941–1942, p. 120). Siberia, east as far as Amur (BRU l.c., p. 402). Korea; northern China; Sakhalin; Japan (BRU l.c.).

### Ecology

On sandy or gravelly, more or less dry soil, often overgrown with *Calluna*, in open situations or with very sparse growth of trees, for example in pine heaths; also on sandy cultivated soil and in gravel pits. In Denmark (West 1940, p. 3) and England (FWL 1887, p. 9) likewise often found in open heaths. On the other hand, according to numerous consistent records, in Germany it is a true forest animal, associated especially with pine forest (D.E.Z. 1911, p. 693; NBG 1933, p. 49; GRD 1937, p. 38; HSL 1938, p. 37; HOR 1941, p. 56). In Siberia the species occurs in the tundra (BRU 1932–1936, p. 402).

### Biology

The scant dated Swedish catches are distributed as follows: III: 1; IV: 1; V: 16; VI: 13; VII: 13; VIII: 5; IX: 3; X: 1. In Denmark the maximum abundance in May is much more pronounced, and two larvae were detected in June (LRS 1939, p. 314). I saw a beetle which had not yet hardened in September (Ögl). A spring breeder, hibernating as an adult (LRS l.c., p. 351). This beetle was observed feeding on *Helix arbustorum* (Dahl 1925, p. 19).

### Dynamics

The insect is flightless. Wings constantly stunted.

### Variation

According to BRU (1932–1936, p. 394) the typical *arvensis* s. str. is found exclusively in Fennoscandia; in Denmark it has been confused with *germaniae*



Leng. In other parts of the region of distribution various other forms have been reported.

### Fossil Records

Belgium, interglacial (LAP 1902, 1903). Switzerland, in "glacial deposits" (Heer, according to BRU 1932–1936, p. 1570).

### *Carabus auratus* L.

#### Distribution

(map in BRU 1932–1936, pl. 14)

*Norway*: Only 1 specimen, May 1899, found near Bestumkilen, Oslo (HLS 1911, p. 4; N.E.T. 1926, p. 67). Without doubt, this specimen was accidentally introduced.

Not found in the rest of Fennoscandia. The old records from Sweden (based on Linné 1761) are undoubtedly erroneous. Moreover there are two specimens in coll. THS (MB!) labeled with illegible abbreviations that Prof. Kuntzen has respectively interpreted as Husie and Alnarp (in Skå). A Swedish origin for these specimens is not acceptable since THS certainly would not have left such interesting finds unpublished.

*Adjacent regions*: Absent.

*Total area*: Solely European species. Predominantly western, east as far as Near Pomerania and Silesia (HOR 1941, p. 46), Bohemia (BRU 1932–1936, p. 648). North as far as Schleswig-Holstein (BRU l.c.). South as far as northern Spain (BRU l.c.) and northern Tirol (HOR l.c.). The records from Poland (LMN 1913, p. 52), Slovakia (ROU 1930, p. 88), Hungary (KTY 1900, p. 22), and even from Russia and North America are partly doubtful, and partly explained as accidentally introduced (BRU l.c.).

### Ecology

In Central Europe an insect of open terrain, especially of cultivated soil, preferring loamy soil (see BRN 1937, p. 23; GRD 1937, p. 76; HSL 1938, p. 41; HOR 1941, p. 46).

### Biology

Development in Central Europe takes place in summer (Kern, E.B. 1921, p. 162; 1925, p. 114) and hence hibernation thus occurs in the adult stage. At least in captivity the beetle may live for several years (E.B. 1921, p. 162). It is a highly polyphagous carnivore, which even accepts carrion (BRN 1937, p. 23; BUR 1939, p. 34).

## Dynamics

Wings always totally reduced. Nevertheless the species has a good capability of dispersal in cultivated plains, and mass migration has often been observed (KZN in litt.). "In northern Germany the insect is presently advancing eastward" (BRU 1932–1936; also according to GRD 1937, p. 76).

*Carabus auronitens* Fbr.: Since the "var. *nitens*" of Linné proved identical to this species (GYL 1810, p. 69; SFR 1871), *C. auronitens*, though recorded for Sweden (Öld), does not occur in this region (strong doubts have also been expressed by BRU 1932–1936, p. 1486).

\**Carabus cancellatus* Ill.

## Distribution

(map in BRU 1932–1936, pls. 12, 13)

*Sweden*: Predominantly a southwestern species, which is usually rather frequent within its comparatively small and completely continuous area. Delimiting localities north and east are: Vrm Arvika, Gränsjön, 1935–1939, several specimens (EVK!); Alster, September 1928 (ZRN!); Lundsberg, May 4, 1940, 4 specimens (Rapp, coll. WRN); Dlr Söderbärke, Tolfsboberg, potato field, September 30, 1942, 2 specimens (OTT!); Vst Arboga (KST, according to KLF); Sdm Äsgård, December 10, 1895 (v. Post, according to a handwritten note by THS with his specimen: "Skandinavien Insecter"); Ögl Västra-Ny, 1852 (HGN 1853, p. 16); Linköping (ADZ, MS!); Kisa, 1934, 2 specimens (coll. Palm!); Små Rumsquilla, several specimens (WLE); Mörlunda, June 12, 1932, 1 specimen (LOH, according to JNS); Fliseryd, March 24, 1918 (WLE!). Only on southern Öld; northernmost localities: Färjestaden and Tveta (BOH, according to manuscript in K.V. Ak.).

Doubtful: Upl (GLL 1896, p. 2; 1 specimen, KHK!); according to a letter from KHG, his father (KHK) found three specimens in the Uppsala region during the 1890's.

344 Erroneous: Tol (KLS, according to ZTT 1840, p. 32).

*Norway*: In the southeast continuously distributed along the coast from the Swedish border as far as 5 Kristiansand (N.E.T. 1926, p. 69). The only true inland locality is northernmost: 10 Søndre Odal (SHY 1879, p. 12; N.E.T. l.c.). Completely isolated near 19 Låerdal (SHL, coll. STA).

*Finland*: In the eastern and central parts of southern Finland widely distributed and often frequent. The area is cohesive and continuous. Delimiting localities: Ka Kotka region (several collectors!); Ta Lammi (KNG); Juupajoki (PHJ); Tb Keuru (PHJ); Ätsäri (RDL); Uurainen (SAR); Hankasalmi (NUM); Pyhähäkki (KRG); Sb Kuopio (several collectors; MH!); Kb Polvijärvi (CRP). Two isolated localities in the extreme southwest: Nl Tvärminne (LNN); Snap-pertuna, Strömsö (HLL, N.E. 1943, p. 40).

*Russian sector:* Only in southernmost Karelia (PPP 1899a, p. 7); Sv Vaaseni (KRV!); Kuujärvi (KNG!); Uslanka (PFF).

*Adjacent regions:* In Denmark frequent and widely distributed, also on Bornholm (West 1940, p. 3). In Estonia widely distributed, especially in the east, also on Ösel (HAB 1936a, and in litt.); Latvia (SDL 1872; ULN 1884; HEY 1903; BRM 1930). Leningrad region (OBT 1876). British Isles, only one specimen in Ireland, certainly accidental (JHS and HLB 1902, p. 557).

*Total area:* Palearctic species (in North America certainly introduced: Leng 1920, p. 44). In Europe south as far as northern Spain (FUE 1918, p. 35), central Italy (LUI 1929, p. 38), Albania (APF 1904, p. 33). Siberia (among others, SBJ 1880, p. 6; MKL 1881, p. 19), east as far as Lena (PPP 1906b, p. 16).

### Ecology

A species of open country, which likes to live in fields and other cultivated terrains. At least in Sweden it clearly seems to prefer loamy soil, but in other countries, including Finland, has been recorded from sandy soil (SBJ 1873, p. 60; N.E. 1934, p. 40; SRN 1926, p. 10), but probably an admixture of loam was present. In northern Germany "heavy soils" have been mentioned (GRD 1937, p. 38).

### Biology

Swedish catches: III: 6; IV: 8; V: 36; VI: 32; VII: 19; VIII: 21; IX: 6; X: 0; XI: 0; XII: 2. Immature beetles August 16 (Skå) and September 30 (Dlr). In Denmark, where the maximum abundance in spring is still more pronounced, 345 larvae observed from May to July, and in Finland in July (LRS 1939, pp. 315, 353). In Germany too development takes place in summer (Kern, E.B. 1921, p. 162; 1925, p. 115). The species hibernates as adult, exceptionally as pupa (E.B. 1925, p. 115) or egg (LRS l.c., p. 353). Carnivorous and feeds also on carrion (BUR 1939, p. 36).

### Dynamics

Wings always totally reduced. Nevertheless the great mobility of the species bestows upon it a comparatively good capability of dispersal in cultivated regions.

### Variation

This species can be separated into numerous different forms. The Scandinavian population is comparatively homogeneous (*cancellatus* s. str.), and its separation into *rauterbergi* Kolbe, occurring in Sweden, and *munsteri* Born

in Norway (BRU 1932–1936, pp. 604–605), is totally artificial. On the other hand, in Finland the species is represented by a distinct subspecies (*tuberculatus* Dej.), which extends east as far as Trans-Baikal, but also south of the Baltic Sea westward as far as Denmark. This form, however, is not always “rufofemoral” in Finland; there are single individuals with entirely black legs (N.E. 1926, p. 86; Tb Pyhäähäkki, June 1944, 2 specimens, KRG). The following statement by Breuning (l.c., p. 576) is likewise not substantiated: “. . . in the Nordic countries (Sweden, Norway) rufofemoral specimens never occur,” since such specimens have been found occasionally in both Norway (Born 1926, p. 69) and Sweden, even though only solitary, and in no other character differ from the black-legged specimens.

#### Fossil Records

Poland, glacial (SCL 1916, p. 46). Belgium, interglacial (LAP 1902, 1903).

#### \**Carabus clathratus* L.

##### Distribution

(map in BRU 1932–1936, pl. 16)

346 *Sweden*: Rare and above all very local. However, the localities form two distinctly separated areas. In the intervening gap there is only the locality Hls Forsa (leg.?, RM! Moreover: Hls, STH, MU!), and it is not certain to which area it belongs. I. Southern area. Delimiting localities north: Dls Mon, Skottsjön, 1933 (LTH); Vrm (probably Segerstad; CDS 1873, p. 17), Visnum, bank of Väner, 1943, 1944, numerous (WRN!); Nke Rinkaby, Hjalmar bank (RGS!); Vst Köping (ADR); Västerås (SDN, MG! SLL, VA!); Upl Uppsala region (several collectors!); Blidö (leg.?, VA!). On the eastern coast the species has not been found to date between Stockholm and central Små; on Öld found many times, but as far as is known only in the Stora-Rör region; from Gtl only on Fårön Island, 1867 (EIS, 1 specimen, MU! E.T. 1928, p. 129). II. The northern area, extending over Nbt, Vbt, and the lower parts of Lapland, is a direct continuation of the Finnish area. Delimiting localities south and west: Vbt Lövsånger, Avan, October 17, 1936 (KHK!); Hällnäs, 1939, two localities (HEQ); Åsl Åsele, May 1884 (coll. TIM, 2 specimens, LU!); Lyl Sorsele (GTZ, E.T. 1932, p. 44; Pil Skatt-träsk, 1931 (PRS, ML!); Arvidsjaur (RGS, coll. LTH); Lul Jockmock (WLD in litt.); Nbt Tarendö, 1942 (A. Rautio, coll. LTH).

*Norway*: Two small areas, respectively on the coast in the southeast and southwest. I. Five localities on both sides of Oslo Fjord (N.E.T. 1926, p. 68). II. 6, several localities in Jæren, but rare; Karmøy; Haugesund (HLS 1915, p. 8; N.E.T. l.c.).



*Finland:* Extremely local and generally rare, but distributed as far as latitude 65° N without discernible gaps. From Åland there are only old records without localities (MH!); contrarily, found on Al Kökar (GRQ, coll. HLQ!). Northernmost localities: Lk Muonio (MTL: N.E. 1934, p. 40); Kittilä (K.O. Elfving, MH!); Ob Rovaniemi (EHN, MÅ!); Pudasjärvi (BDR, MH!); Ok Ruhtinassalmi, numerous specimens (SSK, several collectors!).

*Russian sector:* On Lake Ladoga in the extreme south three localities (KRH! PFF! PME!). Kc Tschirkka River (PPP 1899a, p. 7; Kr Suma (PPP l.c.; MH!).

*Adjacent regions:* In Denmark widely distributed, in Jylland even frequent, scarcer on the islands, not known from Bornholm (West 1940, p. 3). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 323), including Ireland (JHS and HLB 1902, p. 556).

*Total area:* Palearctic species. In Europe predominantly an eastern species, south as far as Holland (EVS 1898, p. 42), Bavaria (according to 347 HOR 1941, p. 51, doubtful), southeastern France (DEV 1935, p. 18), northern Italy (LUI 1929, p. 37), Greece (BRU 1932–1936, p. 550). In the northeast as far as Arkhangel'sk (HLL!). The Caucasus (BRU l.c.). Kirgizia and western Turkestan (HEY 1896, p. 7). Siberia (among others, SBJ 1880, p. 6), east as far as Amur (HEY 1880–1881, p. 7; 1893, p. 9) and Lena (PPP 1906b, p. 16). Korea; Manchuria; Japan (BRU l.c., p. 553).

### Ecology

This species is the most humidity-loving of all our *Carabus* species, and always lives on the banks of stagnant fresh water, large lakes as well as ponds, peat cuttings, etc.; in Denmark also found in marshy meadows at the sea (West 1940, p. 3). It decidedly seems to prefer peat, or at least peat-mixed soil; at any rate it is missing in pure sand, gravel, or loam. Vegetation must be rich and extend into water; the species, however, is not found in *Sphagnum*. It lives in very wet conditions and even dives into the water spontaneously (N.E. 1933, p. 106). In the rest of Europe the species seems to be more restricted to peat bogs than with us (E.N. 1883, p. 219; S.E.Z. 1915, p. 209; Dahl 1928, p. 24; E.M.M. 1914, p. 102), and has been designated "tyrphophil" (Peus 1928, pp. 576, 668).

### Biology

The few dated southern Swedish catches can be divided as follows: III: 3; IV: 3; V: 9; VI: 6; VII: 3; VIII: 4; IX: 1; X: 1; XI: 1; XII: 1. In Denmark, where the maximum abundance in May is more pronounced, larvae have been found in June and the beginning of July (LRS 1939, p. 314), in Sweden, May 24 (1st-instar, Upl; BNG 1927, p. 57), July 12, July 23 (Dsl, LTH). It is therefore normally a spring breeder, hibernating as an adult; the record of an immature

beetle on June 25, 1929 (Ögl Tåkern, Palm!) is strange. In Denmark the beetle has been observed preying on tadpoles and noctuids (West 1940, p. 3) and in Germany consuming dead frogs (Rapp 1933, p. 13).

### Dynamics

Wing dimorphism evident. Brachypterous individuals have a small, narrow wing rudiment equal in length to an elytron. In macropterous individuals the wings are fully developed and functional. Flight observations: Små Liatorp (KMN in litt.); Austria (HFM 1925, p. 59); Siberia (MDL 1931, p. 3).

348

### Variation

The species can be separated into different subspecies, but the Northern Palearctic populations (east as far as Lena) are homogeneous ("*Jansoni* Kr."; BRU 1932–1936, p. 552).

#### *\*Carabus convexus* Fbr.

##### Distribution

(map in BRU 1932–1936, pl. 26)

*Sweden*: A southern and primarily western species, occurring sparsely but apparently continuously from Skå as far as the Norwegian border. The eastern limit is marked by the following localities: Skå Benestad (BEN, ML!); Klinta, near Ringsjön, August 1862 (BOH 1863, p. 67); Båstad (THS, MB!); Hll Vapnö and Harplinge (FGQ); Vgl Borås region (ÖST, MG!); Ållberg, 1866 (EIS, MU!); Ögl Omberg, 1928 and 1929, several specimens (Palm!); Nässja, May 8, 1932, 1 specimen (Palm); Västra-Ny, 1852 (HGN 1853, p. 16). Northernmost localities: Vgl Älgårås region (KHK!); Kinnekulle (MRT 1873, p. 9; HCK, VM); Dsl Mellerud region, 1 specimen (FBG!); Ed, Bällnäs, April 1930 (SVS); Boh Bullaren, July 26, 1933 (LTH); Strömstad region (CDS 1873, p. 17).

Doubtful: Öld (AHT, 1 specimen, VA!).

*Norway*: Exclusively in the southeast (N.E.T. 1926, p. 72). Most of the localities lie close to the western side of Oslo Fjord, north as far as 2 Ringerike (SHY 1879, p. 11). Then: 1 Halden, Romskog; 10 Søndre-Odal (SHY l.c.). The westernmost, and isolated locality is 4 Nes-Verk (SPS, according to SIE 1875, p. 78).

*Finland*: Very rare and only in the south. I. In the southeast (IK), north as far as Ka Viborg (MNH, MKL, MH!). II. In the southwest: NI Tvärminne (HÄY, MH!); Hangö, Henriksberg, 3 specimens (RDL). Ab Vichtis (FA). Al Föglö (BFF, MH!).

*Russian sector*: No records.

*Adjacent regions:* In Denmark widely distributed (however, not found on Bornholm), but not frequent (West 1940, p. 4). In Estonia several localities, also on Ösel, but to date not recorded on the northern coast (HAB in litt.); Latvia (ULN 1884; HEY 1903; LBÅ 1932). From Leningrad region, as far as I am aware, no records published to date. Not found on the British Isles.

*Total area:* Palearctic species. In Europe south as far as northern Spain 349 (FUE 1918, p. 34), southern Italy (LUI 1929, p. 37), Greece (OTZ 1886, p. 204). Asia Minor (BRU 1932–1936, p. 871). The Caucasus (SDR and LDR 1878, p. 62). Kirgizia (HEY 1880–1881, p. 10). Western Turkestan (HEY 1898, p. 7). Western Siberia (among others, SBJ 1880, p. 7).

### Ecology

In its mode of life, this species is closest to *arvensis*. It lives on moderately to poorly overgrown sandy or gravelly soil, either in open situations or with moderate shade of deciduous trees or shrubs. However, it seems to prefer a considerable admixture of humus and hence often occurs on sandy garden soil and the like (even in Finland; N.E. 1934, p. 43). A predilection for southern slopes and generally warm locations is evident. In Germany, like *arvensis*, it seems to be predominantly a forest animal (also found in coniferous forests) (NBG 1929, p. 121; GRD 1937, p. 38; HSL 1938, p. 54); however, for Silesia “non-wooded” places have been mentioned (LTZ 1847–1852, p. 86), and NBG (1933, p. 47) has found the species on moraine soil devoid of trees.

### Biology

Distribution of the few Swedish catches: IV: 5; V: 9; VI: 2; VII: 3; VIII: 4; IX: 1. Also in Denmark usually a spring insect (LRS 1939, p. 314). Immature beetles, July 25, 1933 (Boh); in Denmark and Germany at the end of July and the beginning of August (LRS l.c.; NBG 1933; HSL 1938). Oviposition observed in Germany in May (E.B. 1921, p. 162). It is therefore a spring breeder, hibernating as an adult. Its prey consists of worms, mollusks, and insect larvae (BUR 1939, p. 37).

### Dynamics

Wings always reduced.

### Variation

The species comprises a number of subspecies, but the Northern Palearctic populations are homogeneous (*convexus* s. str.; BRU 1932–1936, p. 868).



*\*Carabus (Procrustes) coriaceus* L.

Distribution

(map in BRU 1932–1936, pl. 40)

350 *Sweden*: Distribution strangely split. Three separate subareas are distinguishable: I. Southern, which comprises the main part of Skå, with the following delimiting localities northward: Ravlunda, Skipparp, August 11, 1933 (LOH!); Brösarp, Knaback, June 6, 1932 (OSS, ML!); Västra-Vram (LLJ, MU!); Hässleholm, Statten, 1935, 1937 (PLQ); Åstorp, collected many times (HZE, LGN). Probably continuous with this is the occurrence in southern Hall, where the species has been collected in at least three localities in the Halmstad region (FGQ, E.T. 1922, p. 192! Additionally, Eketånga, August 11, 1940, LDN). II. Öld (HGL, coll. JNS; E.T. 1928, p. 130! WLD in litt.), Stora-Rör, 1934 (leg. ?, 1 specimen confirmed by NST); Böda, 1 specimen (KHK!). III. Another area in central Sweden which, of course, in no way appears to be continuous but, nevertheless, is apparently more or less contiguous with the Norwegian area. Vgl Säter, Rånna, 1941 (OSS); Valle, Höjentorp, June 17, 1928 (ERL, coll. LTH); Kinnekulle, constantly found and not rare, chiefly in Munkängen by several collectors (!). Boh Foss, Torreby (NOT!); Bro, Säm, in the stomach of a crow (NOT 1943, p. 68). Vrm Arvika, Gränsjön, August 19, September 11, 1937; Järnskog, Byre, August 7, 1942 (EVK!). Sdm, many localities and often in large numbers south of Mälaren between Dalarö (OLS! SJB) in the east and Länna, Magsjön (1 specimen, ARW!) in the west. Strangely, however, missing in the parts of Upl lying opposite and appears only in the north of this province, apparently in direct continuity with the Dlr area. Again found in: Gimo (GLL, LF; in coll. GLL, 1 specimen, labeled "Uppl."); Alvkärleby, 1937, 1941 (Palm!). Vst (JHN, according to a note in his "Grill"; possibly from the Västerås region); Ramsberg (WHM, according to KLF). Dlr, seven localities in the south, the northernmost: Ytter-Malung, July 3, 1939 (Olla, coll. LTH); Järna, Marsjöberget, July 22, 1926 (FRL!); Floda, August 1918 (TJB, E.T. 1928, p. 25); Leksand, Sängen, July 1, 1942 (TJT!); Sundborn, Logården and Hosjö, Ryggen (SLV, according to KLF).

Doubtful: Gtl (EIS, 1 specimen, MU!). Hls (leg.?, 1 specimen, RM!).

*Norway*: In the coastal region of almost the entire south, and indeed somewhat unevenly but probably continuously distributed from Oslo Fjord into the Trondheim region (N.E.T. 1926, p. 58). Northernmost localities: 26 Hitra (STM); 27, three localities around Trondheim; 28 Steinkjer (N.E.T. 1923, p. 275; 1937, p. 143). In the actual inland region only one locality: 10 Ris-skogmyra in Åmot (MST).

Doubtful: Dovre (BOH, according to SIE 1875, p. 77). In the Swedish collections there are many specimens labeled "Dovre, BOH," which certainly could not have been collected in this region. These might originate from the Trondheim region, which BOH visited on the same trip (during 1832).



351 *Finland and Russian sector:* Absent.

*Adjacent regions:* In Denmark widely distributed and not rare, also on Bornholm (West 1940, p. 4). In Estonia rather widely distributed, also on Ösel (HAB 1936a) and Dagö, and on the northern coast (HAB in litt.). Latvia (SDL 1872; ULN 1884; HEY 1903; BRM 1930). In Leningrad region several localities, north into the Bjelo-Ostrov region close to the Finnish border (OBT 1876; JAC 1903, p. cxxi; 1905–1908, p. 208; BSK 1925, p. 65). Not found on the British Isles.

*Total area:* Euro-Mediterranean species. In Europe south as far as southern France (DEV 1935, p. 16), southern Italy (BRU 1932–1936, p. 1401), Greece (OTZ 1886, p. 204). East as far as Rumania (APF 1904, p. 21) and Moscow (BRU l.c., p. 1399); according to JAC (1905–1908, p. 208) as far as Charkov and Crimea. Asia Minor (BRU l.c., pp. 1405 ff.).

### Ecology

Definitely a forest species which, however, usually inhabits sparser places and forest fringes. Its mode of life is peculiar in this respect—in Skå, southern Hll, and Kinnekulle in Vgl it almost exclusively lives in beech forests, while in the other parts of the region it occurs in various types of forests, even coniferous, and often at very dry places. Regardless, a distinct layer of humus is essential. The beetles hide during the day under moss or the bark of rotting stumps. In Central Europe it has a strong predilection for beech forests (Dahl 1928, p. 24; GRD 1937, p. 38) but is also found in mixed and coniferous forests (Rapp 1933, p. 7). In Denmark and northwestern Germany, possibly accidentally, also found in open terrain (West 1940, p. 4; SRN 1926, p. 8).

### Biology

Swedish catches: II: 1; III: 2; IV: 3; V: 9; VI: 10; VII: 15; VIII: 13; IX: 8; X: 1; XI: 1. In Denmark a strong decline occurs in June (LRS 1939, p. 315), which has never been observed with us in Skå. In Norway an immature beetle was found in the middle of July (SPS 1901, p. 27). Numerous larvae in Denmark from the end of September to the end of June (LRS, l.c.); I saw two almost fully grown larvae in April 1943 (Sdm Fagersjö Beck). Apparently the larvae hibernate; yet adults also hibernate in such large numbers that LRS's statement  
352 (l.c.; p. 354) that they die in spring without reproducing is hardly credible. The decline in June might, on the contrary, be due to a "summer sleep" (BUR 1939, p. 37; see also *nemoralis*); presumably the beetle normally lives more than a year and might be able to reproduce repeatedly. According to BRU (1932–1936, p. 1410) the beetles emerge both in spring and autumn. Both beetles and larvae feed primarily on snails (MLL 1862, p. 85; KRS 1905, p. 133; Rapp 1933, p. 7); near Vgl Kinnekulle they attack *Helix* and slugs (TBL

in litt.), and near Skå St. Olov larvae of *Cephaleia abietis* L. occurring in the soil (NOT in litt.); other insects as well as "worms" have also been mentioned (BUR 1939, p. 37). Accidentally, probably due to thirst, observed feeding on strawberries and raspberries (GRD 1937, p. 38).

### Dynamics

Wings always completely rudimentary.

### Variation

The species is extremely variable in southern Europe, but in northern and northern Central Europe homogeneous (*coriaceus* s. str.; see BRU 1932–1936, p. 1398).

### Fossil Record

Galicia, glacial (SCL 1916, p. 44).

### \**Carabus glabratus* Payk.

#### Distribution

(maps in DEV 1912; BRU 1932–1936, pl. 19)

*Sweden*: Distributed almost throughout the country, but remarkably uneven in density. In Lapland, Hjd, and Dlr especially frequent and also widely distributed on the west coast. In the loamy regions of the large central Swedish lakes (including all of Vrm) scarce, likewise on Öld; from G:l only 1 specimen is known: Lummelunda, June 1905 (WRN!). On the east coast apparently totally absent in large regions, but partly present in Skå, where the species generally avoids the coast, partly between Ble Karlskrona region (several collectors!) and Ögl Eneby, Tingsbrötan, June 1925 (WSJ!), and partly all the way from Upl Skutskär, June 27, 1936 (LTH) to Nbt Pitsund 1936 (LTH). Also striking is its rare occurrence on central Jtl; for instance, the species has not been recorded to date in the Åre region visited by numerous collectors.

353 *Norway*: Distributed somewhat unevenly but without discernible gaps throughout the country, except the coastal region in the extreme south between 3 Larvik (NTV 1916, p. 17) and 6 Jæren (HLS 1915, p. 9). Northernmost locality: 37 Hammerfest (STD, MB!).

*Finland*: Distributed without gaps and quite regularly throughout the country, except for Al and all the islands in the Gulf of Finland.

*Russian sector*: Found in all parts of the Kola Peninsula. Certainly distributed throughout Karelia, but due to insufficient exploration only two localities known to date from the northern half.

*Adjacent regions:* In Denmark rather rare but quite widely distributed; not known from Bornholm (West 1940, p. 3). Estonia, including Ösel (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 555).

*Total area:* Solely European species. South as far as northern and eastern France (DEV 1935, p. 18), northern Switzerland (BRU 1932–1936, p. 727), northern Italy (DEV 1912), Rumania (BRU l.c., pp. 726 ff.). East as far as Kanin (PPP 1909, p. 4), Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306), Ural (BRU l.c.). The records from western Siberia (HEY 1880–1881, p. 7; JAC 1905–1908, p. 254) are certainly erroneous, since they have been accepted neither by PPP (1910a) nor by BRU (l.c.).

### Ecology

Like *coriaceus*, this species shows a “dual” ecological occurrence. In most parts of the region it is predominantly a forest species, found particularly in dark spruce-mixed forests, especially at moss-rich places, and in Skå also in beech forests. On the other hand, in the fjeld regions, where it is much more frequent, it is in no way restricted to the forest; on the contrary, it is most frequent in sparse stands of the *reg. bet.* (see PPP 1905, p. 84), especially in the lower parts of the *reg. alp.* (in Pil up to an altitude of 1,100 m above sea level), where it occurs in completely open situations on meadow soil as well as on heath soil, provided some moisture is present. On the Kola and Kanin peninsulas (PPP l.c.; 1909, p. 4) also found in the tundra. The species prefers gravelly soil (moraines) everywhere. In Central Europe apparently exclusively a forest species (West 1940, p. 4; DEV 1912; Dahl 1928, p. 28; NBG 1929, p. 122; Rapp 1933, p. 18; GRD 1937, p. 38; HSL 1938, p. 47). In the fjelds, like some other primitive nocturnal insects, the species also hunts during the day.

354 This peculiar behavior has also been observed many times in Central Europe (LTZ 1847–1852, p. 90; RTT 1908, p. 89; BRN 1937, p. 25) and in southern Sweden (Hll, SDN in litt.).

### Biology

Southern Swedish catches: IV: 1; V: 11; VI: 21; VII: 23; VIII: 13. In Denmark the catch period is just as short (LRS 1939, p. 315). Larvae were found in Scandinavia in the months of April, June, and July (l.c., pp. 315, 355); I saw an immature beetle collected on July 26 (Skå). LRS (l.c., p. 355) assumes that hibernation takes place in the larval stage which, at any rate, might be true for southern and central Sweden. The record of immature specimens in the middle of June in Germany (HSL 1938, p. 47) supports this contention, but not the reports of immature beetles observed in August–September (E.B. 1910, p. 267), and oviposition principally in June (E.B. 1924, p. 162). The prey con-



sists of worms, mollusks, and insects (BUR 1939, p. 39). In Finland observed many times feeding on raspberries. (N.E. 1934, p. 41; NDM 1944, p. 28).

### Dynamics

Wings completely rudimentary and the elytra firmly coalesced with each other.

### Variation

A comparatively stable species exhibiting a tendency to form subspecies only in the Central European mountains. Smaller, stout specimens from the north and from the Scandinavian mountains have been described as *lapponicus* Born; this form, however, merges without limitations into *glabratus f. typica* (see BRU 1932–1936, p. 726).

### Fossil Records

Skå and Denmark, postglacial (HNR 1933, p. 124). Galicia, glacial (SCL 1916, p. 46).

### \**Carabus granulatus* L.

#### Distribution

(map in BRU 1932–1936, pl. 15)

*Sweden*: A southern species that nevertheless is continuously distributed north at least as far as Gst. In the west, especially on the coast, much more frequent  
 355 than in the east; on the eastern coast of Skå and Små totally absent, and on Öld and Gtl only four localities each. Northern delimiting localities: Dsl Håbol, 1938 (LOH, according to JNS); Vrm Alster (ZRN!); Lundsberg, 1939, 1 specimen (WRN); Dlr Silvberg, Råmshyttan (ELS, according to KLF); Hedemora, 1935 (JNS); Gagnef, 1943 (Blomberg, according to KLF); Gst Storvik (AND, LF); Upl Älvkarleby, on the islands in Dalälven under bark, November 1936, in large numbers (Palm). Farther north only two solitary localities: Hls Delsbo (Ahlström, coll. WRN); Ång Sollefteå (ARN, according to JNS).

Erroneous: Lapland (ZTT 1840, p. 32; GLL 1896, p. 2).

*Norway*: In the south along the coast from the Swedish border extends into 7 Bergen region (four localities; SPS 1875, p. 17; 1901, p. 28) and widely and continuously distributed. The true inland localities are: 17 Austad (STE, MB!); 10, three localities on the Glommen River, north as far as Grue and Hoff in Solör (SIE 1875, p. 79; N.E.T. 1926, p. 68).

*Finland*: In the south found throughout and usually frequent. However, from Al only one locality known (Eckerö, PFF) and in the Skärgård not found to date east of this; contrarily, found on three islands in the Gulf of Finland.



Toward the north becomes scarcer, but on the coast extends as far as latitude 65° N. Northernmost localities: Ob Hailuoto (CRP!); Uleåborg region (Julin 1792, p. 114); Om Haapavesi (HEL, NL); Sb Kuopio (ELF); Kb Liperi (PME). Farther north, one isolated locality: Ks Paanajärvi, June 3, 1939, 1 specimen (PPF 1943, p. 119).

Doubtful: Lk Muonio (KLS, according to SBJ 1873, p. 60).

*Russian sector:* Only in southern Karelia, four localities, north as far as Kn Jalguba (PPP 1899a, p. 7; MH!).

Erroneous: Kola Peninsula (BRU 1932–1936, p. 537).

*Adjacent regions:* In Denmark widely distributed (also Bornholm) and very frequent (West 1940, p. 3). Estonia, including Ösel (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 324), including Ireland (JHS and HLB 1902, p. 557).

*Total area:* Palearctic species (doubtful in North America; Leng 1920, p. 45). In Europe south as far as northern Spain (BRU 1932–1936, p. 536), central Italy (LUI 1929, p. 37), Greece (OTZ 1886, p. 204). Northeast as far as Pechora (SBJ 1898, p. 338). The Caucasus (LSH 1936, p. 138). Kirgizia (BRU l.c., p. 539). Siberia (among others, SBJ 1880, p. 6; MDL 1931, p. 3), east as far as Lena (PPP 1906b, p. 16) and Amur (HEY 1880–1881, p. 8). Manchuria; Korea; northern China; Sakhalin; Japan (BRU l.c.).

After *clathratus*, with which it often occurs together, this is the most humidity-loving species among the Scandinavian species of *Carabus*. It has a predilection for living in stands of *Alnus glutinosa* on the shores of lakes and rivers. Additionally, occurs in open, not too dry, preferably cultivated terrain, but particularly where there is some shade, be it bushes or tall ground vegetation. In western Sweden often found together with *cancellatus*. It exhibits a distinct preference for loamy, usually humus-mixed soil; also on peat. The humidity requirement of the species is also evident in Central Europe (see Dahl 1928, p. 25; NBG 1933, p. 48). During the day and in winter the species is fond of settling under the loose bark of tree stumps (see S.E.Z. 1891, p. 77).

### Biology

Swedish catches: I: 1; II: 4; III: 7; IV: 11; V: 30; VI: 32; VII: 13; VIII: 12; IX: 9; X: 6; XI: 3. In Denmark maximum abundance during April–May (a second weaker high abundance in September) and numerous larvae found from the end of May to August (LRS 1939, p. 314). Immature beetles, July 25 (Boh), August 10 (Skå), August 18 (Boh). In Germany oviposition occurs in May and larval development in summer (E.B. 1921, pp. 162, 168). Spring breeder, hibernating as an adult. Prey of both, beetles and larvae, are primarily snails,

then insects and worms (BLK 1925, p. 14; Rapp 1933, p. 13; BUR 1939, p. 39), Near Boh Sämstad, on June 27, 1944, a beetle was seen feeding on *Lumbricus*.

### Dynamics

In Central Europe this species exhibits wing dimorphism, or more correctly polymorphism, since there are many intermediate forms between the two (HNM 1929, p. 126). Macropterous individuals are capable of flight and numerous reports on flight available (SRN 1926, p. 9; E.B. 1930, p. 137; 1931, p. 42; HDH, *Rev. Franc. Ent.*, 1936, p. 49; HSL 1938, p. 44). In our region I have only seen brachypterous individuals. The wing rudiment is, of course, extremely variable, sometimes with a distinct reflexed apical part, but never functional since it does not reach even the size of an elytron.

357

### Variation

In southern and southeastern Europe, as well as in Asia, separate subspecies identified. In the rest of Europe the species is homogeneous (*granulatus* s. str.; BRU 1932–1936, p. 534).

### Fossil Records

Skå, postglacial (HNR 1933, p. 124). Galicia, glacial (SCL 1916, p. 46).

### \**Carabus hortensis* L.

#### Distribution

(map in BRU 1932–1936, pl. 18)

*Sweden*: Distributed continuously and probably without gaps throughout southern and central Sweden and in the lower parts of lower Norrland. In eastern Små, on Öld and Gtl, however, only a few localities and to date none on the coast of northeastern Upl. Northernmost or highest localities are: Vrm Likenäs (Palm and LTH 1937, p. 115!); Dlr Sävsnäs, Tyfors, 1937 (H. Johansson, according to KLF); Nås Skansbacken (Å. Andersson, according to KLF); Leksand (SPB! TJB); Enviken, Marnäs, 1942 (according to KLF); Hls Bollnäs, 1942 (ALM); Los (SJB); Ramsjö, 1943 (LDN); Jtl Revsund, frequent (BGW); Frösö, two localities, 1934, 1936 (Holm! LTH); Ång Tåsjö (I. Arwidsson, according to JNS); Åsl Dorotea, July 23, 1936, 2 specimens (LTH); Vbt Hällnäs, Bodarna, August 17, 1934, 1 specimen (HEQ!).

*Norway*: Distributed almost throughout the coastal region and in the valleys of southern Norway, but rare in the extreme south; to date not known in Jæren (HLS 1915, p. 9). Moreover, there seem to be no gaps. Commen-

cing from the Trondheim region (several localities; N.E.T. 1926, p. 73; 1937, p. 144) exclusively on the coast; 29 Mo along Folden Fjord (N.E.T. 1926, l.c.); 31 Alstenöy (ØKL; N.E.T., l.c.); 32 Ramnå (RVÅ, according to STA).

Erroneous: "Foldenfjord Nordlandiae (67°40')"

 (CTT, according to SIE 1875, p. 79). The record evidently relates to Folden Fjord in Province 9 (not the same in Province 33).

*Finland:* Only in the southern half where it is widely distributed. South of latitude 62° N found everywhere and usually frequent; becomes scarcer farther north but probably occurs uninterruptedly. The gaps in parts of Tb and Om may only be apparent. Northernmost localities: Ob Hailuto (WUO 1910, p. 63); Uleåborg (Julin 1792, p. 114; WUO l.c.; MH!); Ok Sotkamo, 1 specimen (PHJ).

358 *Russian sector:* Only three localities in southern Karelia: Sv Podporoze, August 1942 (KNG!); Kuujärvi 1943 (PFF); Ko Suurmäki, 1942 (KRV!).

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) and very frequent (West 1940, p. 3). Estonia, including Ösel (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area:* Solely European species. Predominantly eastern (for instance, it is not found in western Germany, Holland, or Belgium); in France only in the extreme southeast (DEV 1935, p. 18). Isolated in southern Italy (LUI 1929, p. 41). In the Balkans south as far as Greece (APF 1904, p. 41). East as far as Bulgaria and Volga (BRU 1932–1936, p. 708).

### Ecology

A species of deciduous and mixed forests, but only in sparse forest stands, for example, in small woods and public gardens or at forest fringes. Requires a distinct layer of humus and prefers stony, gravelly soil. Lives in rather dry places, preferably where much brushwood is present on the ground and the vegetation shows little continuity. During the last century it seems to have been displaced by *nemoralis* in the vicinity of larger cities. Also in Central Europe predominantly a forest species, found even in coniferous forests (West 1940, p. 3; LTZ 1847–1852, p. 91; RTT 1908, p. 88; Dahl 1928, p. 30; GRD 1937, p. 38).

### Biology

Southern Swedish catches: III: 3; IV: 5; V: 20; VI: 50; VII: 43; VIII: 47; IX: 21; X: 8. In Denmark maximum abundance distinctly in late summer and larvae found in almost every month, but most numerous in April–May (LRS 1939, p. 315). Several immature beetles were found in July and August, from July



9 (Små) to August 15 (Ble). The species hibernates in the larval stage (LRS l.c., p. 353), but there are also many old beetles (also see S.E.Z. 1891, p. 77). The beetle feeds on dead snails (JNN 1905, p. 166) but has been observed consuming a live *Serica brunnea* L. (Hll Halmstad, LDN) and in captivity an immature *C. violaceus* (Små, LTH).

### Dynamics

Wings constantly reduced to a small, narrow scale.

### Fossil Record

Denmark, postglacial (HNR 1933, p. 124).

359

### \**Carabus intricatus* L.

#### Distribution

(maps in BRU 1932–1936, pl. 30; BCH 1938, no. 56)

*Sweden*: Since olden times recorded from Sweden after Linné (1761), but without province or other locality mentioned. The correctness of the provenance has been very rightly questioned. However, in April 1942 the species was discovered in Skå, near Forsakar in Degeberga by BRK, and later rediscovered (among others in October of the same year; 1943, 1 specimen by NOT); total of at least 10 specimens (BRK 1942, p. 38; O.E. 1942, pp. 51 ff.). Furthermore, the question of an accidental occurrence here does not arise. The insect has been included among protected species.

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark rare but found in Jylland, on Fyen, and Bornholm (also by LOH!) (West 1940, p. 4). Not known in Estonia; according to SDL (1872, p. 5; 1891, p. 7) 1 specimen in Latvia. Not known in the Leningrad region. British Isles (Joy 1932, p. 324).

*Total area*: Solely European species, principally southern (for instance, rare in northern Germany; HOR 1941, p. 43). South as far as central and southeastern France (DEV 1935, p. 17), southern Italy including Sicily (BRU 1932–1936, p. 1045), Albania (APF 1904, p. 28), Greece (BRU l.c.). East as far as Bulgaria (APF l.c.), Rumania (PTI 1912, p. 4; BRU l.c.), Slovakia (ROU 1930, p. 86), Galicia (BRU l.c.). JAC (1905–1908, p. 213) records several Russian provinces, east as far as Kiev and Crimea. These have not been mentioned by BRU (l.c.) for some reason; however, the records may be correct since *intricatus* cannot be confused with any other species.



## Ecology

Predominantly a forest species, found principally in deciduous forests on humus-rich soil, and purportedly fond of limestone (BRN 1937, p. 27). It is characteristic of this species that, especially in winter, it hides under moss and bark of tree stumps and fallen branches of trees (West 1940, p. 4; KTT 1873–1874, p. 139; JNN 1905, p. 167; RSK 1926, p. 214; BRU 1932–1936, p. 1049; Rapp 1933, p. 9; HSL 1938, p. 56; FWL 1887, p. 7).

## Biology

In Denmark records of adults are distributed almost throughout the year, although most numerous in early spring and late autumn; a larva was found at the end of July (LRS 1939, p. 314). In Central Europe the beetles hatch in autumn (BRU l.c.; BRN 1937, p. 27). Spring breeder, hibernating as an adult; copulation may take place exceptionally in autumn (BUR 1939, p. 40). The prey apparently consists of insects (BUR l.c.).

## Dynamics

Wings constantly completely stunted. In sparsely wooded regions the dispersal capacity must be very poor.

*\*Carabus menetriesi* Fald.

## Distribution

(maps in BRU 1932–1936, pl. 14; PME and PFF 1943, p. 179)

*Finland:* Exclusively in the extreme southeast. In Ik province, seven localities (several collectors!) but rare. Additionally only: Ka Viborg (LFG, GBL); Jääski (MKL; SBJ 1873, p. 39; MH!).

*Russian sector:* Only in the Swir region, but several localities (several collectors!), east as far as Vosnesenje (SBJ 1881, p. 261; PPP 1899a, p. 7; N.E. 1943, p. 162).

Absent in the rest of Fennoscandia.

*Adjacent regions:* Not found in Denmark. Estonia, especially in the south-east (SDL 1872; HAB and LCK in litt.; HDS!), and also on the northern coast north of Narva (HAB in litt.) and near Hapsal in the west, June 2, 1904 (LCK). Latvia, also on the western coast (SDL 1872, 1891; LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876, BSK 1908, p. xxxix).

*Total area:* Solely European species with very restricted distribution. Predominantly eastern; westernmost localities in eastern Prussia, Upper Silesia, Erzgebirge, and the Bohemian forest (HOR 1941, p. 48), but appears to be isolated. East only as far as Gorki and Perm (JAC 1905–1908, p. 236; BRU

1932–1936, p. 545); south as far as Russia, Poltava, and Poland, Lvov (BRU l.c.). The record from Tobol in western Siberia (CKI, according to JAC l.c.) has not been accepted by BRU (l.c.).

361

### Ecology

The mode of life of this little known species is said to correspond quite closely to that of *clathratus*. It was found mainly on wet marshy soil (N.E. 1934, p. 39; HSL 1938, p. 43). Like the closely related *granulatus*, it often chooses its quarters to hibernate under the bark of tree stumps (HSL l.c.; BUR 1939, p. 41).

### Biology

Since the species generally hibernates as an adult, it must be assumed that it breeds in spring.

### Dynamics

According to BRU (1932–1936, p. 544), the wings are “very highly reduced”. The three specimens studied by me (respectively from Finland, Estonia, and Poland) have a very short and narrow wing rudiment, not even half the length of an elytron, and totally devoid of an apical reflexed part.

### Fossil Record?

According to RTT (1908, p. 86), HNR (1933, p. 270), and other authors, the glacial *C. thürachi* (FLH 1884) is identical with *menetriesi*. This, however, has not been accepted by BRU (1932–1936, p. 1571).

### *Carabus monilis* Fbr.

#### Distribution

(map in BRU 1932–1936, pl. 6)

*Norway*: Only a single locality in the extreme southeast: 1 Fredrikstad, June 29, 1907, 1 specimen on the road (HSS; HLS 1912, p. 4), May 30, 1914, 1 specimen also on the road (HLS); (N.E.T. 1926, p. 70). STA (N.E.T. 1928, p. 257) considers the species imported into Norway.

Absent in the rest of Fennoscandia.

*Adjacent regions*: Absent in Denmark and throughout the entire Baltic Sea region. The nearest localities lie in northwestern Germany. British Isles (Joy 1932, p. 324), including Ireland (JHS and HLB 1902, p. 558).

*Total area*: Solely European species, predominantly southern. In addition

the northernmost localities lie in Germany: Oderwald in Silesia; Bremen region (HOR 1941, pp. 57–58). South as far as southern France (DEV 1935, p. 18), northern Italy (LUI 1929, p. 40), Bulgaria (BRU 1932–1936, p. 335). East as far as Slovakia (ROU 1930, p. 95), Rumania, and Russia, Khar'kov (BRU l.c., p. 347).

### Ecology

In Central Europe an insect of open terrain that avoids forests; also on cultivated soil (Rapp 1933, p. 18; HSL 1938, p. 39; HOR 1941, p. 58).

### Biology

Hibernation is said to occur in the larval stage (E.B. 1921, p. 162; BUR 1939, p. 42). As prey, primarily snails mentioned, then worms and insect larvae (JNN 1905, p. 189; Rapp 1933, p. 18; BUR l.c.).

### Dynamics

Wings completely stunted in the two German specimens examined.

### Variation

In southeastern Europe highly variable. On the other hand, in western Europe only the subspecies *monilis* s. str. occurs, to which the Norwegian specimens belong.

### Fossil Records

Belgium, interglacial (LAP 1902, 1903). Poland, glacial (SCL 1916).

### \**Carabus nemoralis* Müll.

#### Distribution

(maps in BRU 1932–1936, pl. 17; BCH 1938, no. 52)

*Sweden*: In southern and central Sweden the most frequent *Carabus* species almost everywhere, and certainly distributed without gaps as far as the continuous northern limit, represented by the following localities: Vrm Arvika region, 1938, several specimens (EVK!); Hagfors, 1926 (SVS); Dlr Ludvika, Brunnsvik, 1919 (FRL!); Floda, Sångån, 1941 (TJT); Aspeboda, Vassbo (KRZ, according to KLF); Falun, in the city, 1935 (TJB); Gst Ockelbo, 1925 (OTT!); Gävle (KLF). Isolated near Mdp Sundsvall, Ortviken (ADZ, LD).

*Norway*: In the coastal region continuously distributed, extending from



the Swedish border into the Trondheim region. Only in the southeast extends farther inland, north as far as: 16 Vestfjorddal; 12 Jevnaker; Eidsvoll; 10 Søndre-Odal (all in N.E.T. 1926, p. 71). Northernmost localities: 9 Smöla (SIE 1875, p. 78), 27 Trondheim region, 1 specimen, before 1877 (STM 1877, p. 150) but "seems to become more frequent every year" (LYS, N.E.T. 1926, p. 71; 1937, p. 144), June 17, 1925 (LTH).

*Finland:* South of latitude 62° N distributed without gaps. Frequent especially in the southwest, but in Al only on Eckerö (PFF), and absent on all the other islands. Becomes scarcer toward the north and almost sporadic. Northernmost localities: Oa Seinäjoki, 1936 (PHJ); Om Jakobstad, 1933 (Sjöholm, according to STÅ); Sb Kuopio, 1941, 1943, but not in earlier collections (ELF); Kb Joensuu, 1942 (BBG); Ok Sotkamo, 1936 (PHJ). SBJ (1873, p. 60) knew of only three localities in Finland (besides Vasa, WAS; see p. 13) and wrote: "... seems to be almost entirely absent in the inner parts of the country".

*Russian sector:* Strangely, not found to date.

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) and very frequent (West 1940, p. 3). Estonia, also on Ösel (HAB 1936a and in litt.); Latvia (SDL 1872; ULN 1884; HEY 1903). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 555).

*Total area:* Solely European species (undoubtedly introduced into North America; Leng 1920, p. 45). South as far as northern Spain (FUE 1918, p. 36), northern Italy (LUI 1929, p. 40), Yugoslavia (APF 1904, p. 39). East as far as southern Poland and Moscow (BRU 1932-1936, p. 668).

### Ecology

The most eurytopic of all *Carabus* species. Apparently almost unaffected by differences in soil conditions and shade, and to some extent even humidity (although it follows neither *clathratus* in the most humid places, nor *problematicus* in the driest places). It is especially noteworthy that the species is favored by culture or is at least indifferent to it; for this reason it is the only species of the genus which lives not only in the immediate vicinity of cities, but also on farms, load deposits, parks, etc. right inside the city. Often it is found in large numbers trampled and dead on roads. Yet, at least apparently, the species is not dependent on cultivation, occurring in all kinds of open terrain and, moreover, in rather sparse forest stands (deciduous as well as coniferous forests) with a distinct humus layer. Favoring of the species by culture is not so pronounced in Central Europe as in our region. There it is designated as chiefly a forest species (see West 1940, p. 3; RTT 1908, p. 88; Rapp 1933, p. 16; GRD 1937, p. 38).



## Biology

Swedish catches: III: 6; IV: 20; V: 41; VI: 62; VII: 22; VIII: 36; IX: 16; X: 18; XI: 3. The decline in midsummer is still more pronounced in Denmark (LRS 1939, p. 314). However, it might not be correct to consider this, as LRS (l.c., p. 350) has done, an indication of the species dying out; on the contrary, the insects may undergo a "summer sleep" (HSL 1938, p. 47). In my opinion species of *Carabus* usually live more than a year as adults. Many immature beetles have been found between July 20 (Små) and August 13 (Skå). Larvae occur at the end of June and in July (Dsl, Vrm), in Denmark from May to the beginning of August (LRS, l.c.). Spring breeder, hibernating as an adult. Oddly, a pupa was found in Germany in March (E.B. 1921, p. 170). Earthworms, snails (and slugs), and noctuid larvae have been mentioned as prey (Dahl 1925, p. 17); according to GRD (1937, p. 80) the beetle does not attack live snails, only crushed ones. Also observed feeding on flowers of maple (JNN 1905, p. 165).

## Dynamics

Wings constantly completely stunted. However, as an ecologically ubiquitous species a remarkable capability of dispersal must be ascribed to this species, and even an anthropochorous dispersal (such as to America) must be taken into consideration. In our region in recent years the species seems to have increased in numbers, and in the vicinity of cities concomitantly displaced other species of *Carabus*, such as *hortensis*.

## Variation

A stable species, which has formed a separate subspecies (BRU 1932–1936, p. 668) only in the southwest (France, Spain).

## Fossil Records

Belgium, interglacial (LAP 1902, 1903). Galicia, glacial (SCL 1916, p. 46).

365

## \**Carabus nitens* L.

### Distribution

(map in BRU 1932–1936, pl. 25)

*Sweden*: Extremely local and generally rare. The main southern area might, however, be continuous. The species has not been found to date along the eastern coast, north of central Små; yet on Öld and Gtl there are several localities. Throughout the entire Mälar region there is only a single definite locality: Upl Länna (near Uppsala), 2 specimens (WRN). Northernmost lo-

calities: Dlr Lima, 1933, 1936; Hemfjället in Transtrand, 1920 (OLS!); Särna (AND, LF); Rättvik, Skålberget, 1938 (WSJ!); Hls (GLL 1896, p. 1; leg. ?, 1 specimen, RM!); Mdp Alnön (ADZ, LD). Separated from the rest of the Swedish area, but contiguous with the Finnish area: Nbt Karl-Gustav, 1941, 1 specimen (SJB).

*Norway:* Three completely separated areas. I. In the southeast and along the coast, from the Swedish border as far as 7 Bergen, Årstad, 1871, 1 specimen (SPS 1871, p. 17; 1901, p. 28). Northernmost localities: 13 Neverfjell near Lillehammer; Fåberg (SIE 1875, p. 79); 25 Röros (MST, N.E.T. 1926, p. 66). II. Six localities in the coastal region of the north between 31 Dönnä (STE; SPS 1902, p. 5) and 33 Evenes in Ofoten (ZTT 1840, p. 32). III. Six localities in 41 southern Varanger (several collectors; SPS 1888–1889, p. 94; 1894, p. 54; N.E.T. 1926, p. 66).

*Finland:* Much more frequent and more continuously distributed than in Scandinavia. At least south of about latitude 66° N distributed without gaps. Also found on Åland, Eckerö (LBG!), Hammarland (KAN, coll. STK), and the islands eastward, as well as on Tytärsaari in the Gulf of Finland (THG). Northernmost localities: Lk Muonio (SBJ 1873, p. 61; MTL, N.E. 1934, p. 43); Kittilä (SAD, MH! MER, MÅ! KRG!); Sodankylä (SUD, MH!); Li Ivalo (SBJ, MH!); Lp Trifona (HLL, MH!).

*Russian sector:* Scattered localities on the Kola Peninsula, even on the northern coast and near Lj Ponoj in the east (PPP 1905, p. 85; N.E. 1934, p. 42; MH!). In Karelia, near Kr Suma (LEV, MH!) on the White Sea, and five localities in the south, north as far as Kn Semsjärvi (CRP!).

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) but not frequent (West 1940, p. 4). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 324), including Ireland (JHS and HLB 1902, p. 557).

366 *Total area:* Solely European species. Predominantly eastern, south as far as northern Spain, northern Italy, and Rumania (BRU 1932–1936, pp. 852–853). East as far as Kanin Peninsula (PPP 1909, p. 4), Perm region (JAC 1905–1908, p. 234), Ural (PPP 1910a, p. 298).

### Ecology

This species is unique in that it occurs in both very dry places and humid to very wet places. This “dual” occurrence has been remarked upon repeatedly (E.B. 1927, p. 93; ROU 1934, p. 69; BRN 1937, p. 27; HSL 1938, p. 53). Seemingly occurs in moors mainly in western Europe: Denmark (F.E. 1910, p. 33), western Germany (E.N. 1883, p. 219; BRN and PTZ 1933, p. 234; Peus 1928, p. 576), the British Isles (E.M.M. 1917, p. 162; 1928, p. 140). For Finland, contrarily, only dry biotopes are mentioned (SBJ 1873, p. 61; N.E. 1934, p. 42),

and on Öld and Gtl the species lives on "Alvar†", while at the western coast of Sweden it lives mainly on moist soil. Reports of a more xerophilous occurrence are chiefly from Germany (CLS 1851, p. 109; WHF 1891, p. 8; S.E.Z. 1915, p. 209; Dahl 1928, p. 26; NBG 1933, p. 48; GRD 1937, p. 38), and also France (JEA 1941–1942, p. 108). Common to all the biotopes inhabited by this species is the presence of *Calluna vulgaris*. Hence whether the soil consists of sand or peat appears inconsequential, and likewise whether it is dry or wet. The insect totally avoids loamy region. In our region it is always found in more or less open situations, while in Germany there are records from pine forests (S.E.Z. 1852, p. 134; Dahl l.c.). The record of mass occurrence of this species on the sandy seashore near St Ytterö is strange indeed (N.E. 1934, p. 63). On the Kola and Kanin Peninsulas the species extends to the tundra (PPP 1905, p. 17; 1909, p. 4), but in Scandinavia does not reach the actual fjeld region.

### Biology

Swedish catches: II: 1; III: 0; IV: 4; V: 31; VI: 12; VII: 2; VIII: 1. Very exclusively a spring species here as well as in Denmark (LRS 1939, p. 314). As for northern Germany, I have been informed by NBG (in litt.) that he has seen the species only in spring and early summer (also see BRN 1937, p. 27). Larvae were found in Denmark at the end of May and in June (LRS l.c.). Spring breeder, hibernating as an adult.

### Dynamics

Wings completely stunted.

367

### Variation

The species is definitely homogeneous, and the form described as *fennicus* Géh. with interrupted veins in the elytra, constitutes an insignificant aberration (BRU 1932–1936, p. 852).

### Fossil Records

Denmark, postglacial (HNR 1933, p. 123). Scotland, "Pleistocene" (Bell 1922, p. 46). Belgium, interglacial (LAP 1902, 1903).

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

*\*Carabus problematicus* Hbst.  
(*catenulatus* auct. nec Scop.)

Distribution

(maps in BRU 1932–1936, pl. 23; STA 1935; LTH 1939a, p. 257)

*Sweden*: Three subareas. I. Southern and central Sweden, widely distributed but extremely local and generally rare to very rare; only on the west coast (Göteborg region and northwards) almost frequent at some places. In Skå found only inland, south as far as Södra-Sandby, June 1865 (MLF, MG!). On the east coast between Ble and Stockholm only three localities: Små Oskarshamn, 1882 (STH, ML!); Misterhult, Mörtfors, 1942 (LDN); Ögl Krokek, Elgsjön, 1932 (LOH!). Northernmost localities of the comparatively continuous southern area: Vrm Torsby, 1923 (SVS); Alster, 1929 (ZRN); Lundsberg, found many times (WRN); Karlskoga, Skråmmen, 1890 (RMN, RM!); Vst (JHN, according to a note in his "Grill," probably Vällnora region: LPA, 2 specimens, VA!); Upl Uppsala (several collectors!); Rasbo (KHK!); Vällnora (RGS!). II. In the fjeld regions of Dlr, Hjd and southwestern Jtl. Delimiting localities: Dlr Lima, 1 specimen (OLS!); Älvdalen, Havtjärnsheden, June 18, 1939, 1 specimen (KLF); Särna (AND, LF); Hjd Vemdalen, Sandviken (CDG); Jtl Bydalen (ALR, SA!); Åre, 1923 (Windahl, LF!); Storsnasen, June 16, 1934, 4 specimens (LTH). III. Karesuando parish in the extreme north (Tol), already reported by ZTT (1828, p. 17; 1840, p. 32). Doubts expressed about this report (LTH 1935a, p. 23; STA 1935, p. 66) may not be justified, since the species was later rediscovered by BRC: Kummajärvi, July 27, Rautastjatja, July 30, 1935, 1 specimen each (RM!).

Doubtful: Gtl Visby (ARN, according to JNS, E.T. 1928, p. 127).

*Norway*: I. In southern Norway almost universally distributed, but on the actual southern coast only two localities known. In the Dovre region (21) and the extreme southwest (Jæren and Ryfylke as well as adjacent fjeld regions) 368 very frequent. Northernmost localities: 26 Frøya (STM 1877, p. 149); Valler-sund (N.E.T. 1937, p. 144); 27 Trondheim, August 1876 (STM l.c.); 29 Vikna, near Folla (CTT). II. In the north, chiefly in the coastal region, between 31 Bodö, June 1925, 1 specimen (LTH) and 41 southern Varanger, three localities. A résumé of the Norwegian localities is given by STA, 1935 (most of which are also in N.E.T. 1926, pp. 64–66).

*Finland*: Extremely rare. I. In the high north (LP) on the Polar Sea coast three localities (N.E. 1934, pp. 41, 42; also STN!). II. On Hogland Island in the Gulf of Finland, 1873, 1 specimen (N.E., l.c.; MH!); later, fragments of a second specimen were found by KRG.

Doubtful: "Savolaks" (SBC 1834, p. 212), "Torneå Lappmark" (SBJ 1873, p. 59); no voucher specimens. Le Karesuando (GPE, according to SBJ, l.c.; probably on the Swedish side). St Björneborg (LMK, MH! Unreliable according to HLL, in litt.).



*Russian sector:* Only on the Kola Peninsula, but found in numerous localities, especially on the northern coast, east as far as Lj Ponoj (MH!); on the southern side only near Lm Konosero (MH!); (PPP 1905, p. 84; N.E. 1934, p. 41).

*Adjacent regions:* In Denmark, only in Jylland, but widely distributed there (West 1940, p. 4, and in litt.). Doubtful in Estonia (SDL 1872, 1891) and eastern Latvia (ULN 1884). Not known in Leningrad region. British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 555). Shetland (West 1930, p. 68). The Faeroes (West 1930, p. 6). Iceland (LTH 1931, p. 165).

*Total area:* Solely European species. Predominantly western, in Central Europe east as far as western Prussia (HOR 1941, p. 45), Slovakia (ROU 1930, p. 87); according to JAC (1905–1908, p. 215) in Podolia (the record of “Witebsk” apparently refers to the doubtful occurrence in Latvia; see above). South as far as northern Spain (FUE 1918, p. 24), northern Italy (LUI 1929, p. 33), Transylvania (PTI 1912, p. 4). The forms *beauvoisi* Dej. and *californicus* Motsch. recorded from North America actually originated from Europe according to BRU (1932–1936, p. 823); according to Leng (1920, p. 44) *californicus* belongs to *limbatus* Say. At any rate *problematicus* seems to be absent in America.

### Ecology

369 A distinct xerophilous species, which lives on heathland that is completely open or with a very sparse growth of pines; tolerates very low ground vegetation, usually consisting of shoots (for example, *Calluna* and *Empetrum*) and lichens. Always on gravelly soil, usually moraine; the record from loamy soil in Germany (Dahl 1928, p. 29) seems doubtful. In the fjelds found in alpine dwarf shrub heath with *Phyllodoce*, *Cassiope hypnoides*, and such (in Hjd up to an altitude of 1,100 m above sea level), and in the tundra of the Kola Peninsula (PPP 1905, p. 84; 1910a, p. 297). In Central Europe apparently the species is a forest animal to a much greater extent than with us (S.E.Z. 1852, p. 133; Dahl l.c.; Rapp 1933, p. 10; ROU 1934, p. 69; HSL 1938, p. 52).

### Biology

The few dated southern Swedish catches are distributed as follows: IV: 1; V: 15; VI: 11; VII: 9; VIII: 5; IX: 4. In Denmark maximum abundance in May (LRS 1939, p. 315). In northern Norway immature beetles observed in August (STA in litt.), in Germany partly likewise in August–September (E.B. 1910, p. 267), but partly also in June (HSL 1938, p. 52). It might well be true, as assumed by LRS (l.c., p. 352), that the breeding periods of the species vary in different parts of the total area (or in different races of this polymorphic species), and that in our region it is probably a spring breeder hibernating as an adult. Prey:

snails (Rapp 1933, p. 10), larvae of butterflies (BRN 1937, p. 26) and "worms" (BLK 1925, p. 14).

### Dynamics

Wings always completely stunted.

### Variation

The species is extremely variable and in Fennoscandia at least three different forms are recognizable, which have been treated quite diversely by Born (1926, p. 64), HLL (1934, p. 42), BRU (1932–1936, pp. 806 ff.). Studies conducted by STA (1935) are more detailed and more precise, and an exact mapping of the distribution of the three forms has been presented.

### Fossil Records

The Faeroes, undetermined age (JSS and RSS 1922, p. 13). England, post-glacial (Bell 1922, p. 46). Belgium, interglacial (LAP 1902, 1903).

370

### \**Carabus violaceus* L.

#### Distribution

(map in BRU 1932–1936, pl. 37)

*Sweden:* Almost uniformly distributed throughout the country. Gaps in distribution small and barely discernible on the map. However, the species is completely absent in the environs of Göteborg and has not been recorded on the eastern coast of Skå. In eastern Lapland it gradually becomes scarcer; in Tol it is found only in the Torneträsk region (several collectors!); in Lul three localities are known: Kvickjok, Njunjes (LTH); Malmberget (SDH!); Pålkem (WRN).

*Norway:* Except for the extreme northeast, distributed densely and uninterruptedly throughout the country (N.E.T. 1926, p. 59). Delimiting localities: 38 Alta, Bossekop (according to STA); 37 Söröya; Hammerfest (several collectors); Kvalsund (N.E.T. 1926, p. 63); Honningsvåg (JEN, according to STA).

*Finland:* Far scarcer than in Scandinavia. Three separate areas. I. Southwest: Numerous localities, also on Åland and the islands of Al Föglö (STN! HLL) and Ab Hitis (KLG, coll. GBL). Inland delimiting localities: Ab Nystad (SDM, MH!); Ta Pirkkala (GBL); Padasjoki (EHN, MH!); Sa Heinola (N.E. 1934, p. 44); Ni Helsinki (KRG, FRS). II. Karelian Isthmus (Ik): Terijoki (BKM 1908, p. 18); Kivennapa (KRG); Metsäpirtti (N.E. 1934, p. 44). III. Distributed continuously between about latitude 64° and 68° N. Delimiting localities: southward—Ob Uleåborg region (Julin 1792, p. 114); Ok Kajana (WUO,

MH! CRP!), Sotkamo (PHJ); Kb Juuka, Juuanvaara, fragment (KRG!). Northward: Lk Pallastunturi (RNK, KNG); Kittilä (SAA!); Sodankylä (SUD, MH!); Ks Salla (several collectors!).

*Russian sector:* Four widely separated localities: Lt Kola city (PPP 1905, p. 84; MH!). Lv Varsuga (PPP l.c.). Kc Vuonninen, 1942 (HDL). Kn Karhumäki, 1942 (CRP!).

*Adjacent regions:* In Denmark widely distributed, also on Bornholm, and frequent (West 1940, p. 4). In Estonia rare, but found in the Peipus region and on the northern coast (HAB and LCK in litt.). Latvia (SDL 1872; ULN 1884; LCK and MIK 1939; LCK in litt.); seems to be absent in Kurland. Leningrad region (OBT 1876). British Isles (Joy 1932, p. 324), also Ireland (JHS and HLB 1902, p. 556).

- 371 *Total area:* Palearctic species. In Europe south as far as southeastern France (DEV 1935, p. 16), northern Spain (BRU 1932–1936, p. 1244), southern Italy (BRU, l.c., p. 1259), Bulgaria (APF 1904, p. 28). In the northeast as far as Perm (BRU l.c., p. 1276). Kirgizia and western Siberia (BRU l.c.).

### Ecology

Quite predominantly a forest species which, however, lives in sparse forest stands with fairly dry soil, frequently with only a very insignificant layer of humus. Usually found on gravelly soil, but does not avoid sand or loam. The species is in general quite eurytopic and occurs in deciduous as well as coniferous forests. On Öld and Gtl moves to the open Alvar,† and indeed to locations somewhat shaded by *Juniperus* bushes. In the fjelds extends beyond the timber line rather markedly (in Pil up to 1,100 m, LTH; in Lul Sarek up to 1,200 m above sea level, SWB, coll. Palm!), but in the *reg. alp.* (in contrast to *glabratus*) usually found in more richly overgrown, meadow-type places. In Central Europe also predominantly a forest species (see West 1940, p. 4; GRD 1937, p. 38).

### Biology

Southern Swedish catches: III: 4; IV: 15; V: 29; VI: 55; VII: 60; VIII: 41; IX: 10; X: 1. In Denmark likewise rather uniformly distributed throughout the summer; numerous larvae found there in autumn, and solitary larvae also in March and May. LRS (1939, pp. 315, 354) thus concludes that the species breeds in autumn and hence hibernates primarily as larvae. The Swedish data on immature beetles is very odd: June 25 (Dlr), June 30 (Gst); July 3 (Nke), July 9, July 17 (Små), July 21 (Dsl), August 14 (Gtl), September 2 (Dlr).

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

In Germany also, immature beetles have been observed both in June (HSL 1938, p. 60) and in August–September (E.B. 1910, p. 267) and furthermore, oviposition in June (E.B. 1921, p. 162). BRU (1932–1936, p. 1276) states: “Emerges partly in autumn, partly in spring”. It seems that this might also be true for our region, and hence at least a small number of individuals are spring breeders. Feeds on crushed snails (Upl, slug, LTH; Rapp 1933, p. 9), and in captivity consumed a *Geometra* pupa (LTH); also feeds on carrion (Rapp l.c.), fungi (BUR 1939, p. 46), and butterfly bait (West 1940, p. 4).

372

### Dynamics

Wings completely reduced. However, the species certainly has a comparatively good capability of dispersal because it exhibits a very marked migratory instinct (see E.T. 1933, p. 285; similar case observed by STA, in litt., in northern Norway). It is also noteworthy that in the Skärgård of Stockholm it has even been found on the outermost small cliffs.

### Variation

The species is unusually variable and opinion quite divided concerning the taxonomic position of individual forms (especially those of Central Europe). The Fennoscandian specimens have been combined under *ottonis* Csiki by BRU (1932–1936, p. 1267), with the remark that the specimens from Åland belong to the eastern form *wolffi* Dej. He considers the variety *arcticus* Sp.-Schn. from the fjeld regions only a “morph” of *ottonis*, but he has given no name to the slender western Scandinavian *ottonis* sensu Born (1926, p. 59). HLL (1934, p. 44) also studied the Nordic *violaceus* forms. A better discussion of them is given by STA (N.E.T. 1928, p. 113; 1938, p. 113).

### Fossil Records

Denmark, postglacial (HNR 1933, p. 123). Belgium, interglacial (LAP 1902, 1903). Galicia, glacial (SCL 1916, p. 44).

\**Chlaenius costulatus* Motsch.

(*illigeri* Crotch, *quadrisulcatus* Ill. nec Payk.)

### Distribution

*Finland*: Only two definite localities: Ta Lampis (FUR, MH!). Ok Ruhtinassalmi, Kiannanjärvi, May 30, 1920, 2 specimens, Majoki, June 9, 1922, 1 specimen (SSK; HLL 1921a, p. 35; MH! MÅ!). In addition just one old record from “Lapponia” (SBJ 1873, p. 125; 1874, p. 471; KLS, MH! coll. JNS!).



*Russian sector:* Sv Mjatusova (HBG, according to PPP 1899a, p. 17; no voucher specimen).

Absent in the rest of Fennoscandia.

*Adjacent regions:* Absent in Denmark. In Estonia six localities, two on the northern coast, including one on the small island of Sala (SDL 1872, 1891; HAB in litt.). Latvia, six localities in Kurland (LCK 1927; LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876; BSK 1922, p. 55).

*Total area:* Palearctic species. In Europe only in the northeast, west into the Hamburg region (only 1 specimen; HOR 1941, p. 197); south as far as Eilenburg along the midcourse of the Elbe (HOR l.c.), Poland (LMN 1913, p. 56; KTZ, P.P.E. 1926, p. 237; TEN 1931, p. 331) and Russia, Mogilev (JAC 1905–1908, p. 316). Siberia (JAC, l.c.), east as far as Amur (HEY 1880–1881, p. 23).

### Ecology

Certainly originally a swamp beetle, which “loves proximity to marshy meadows” (LNZ 1857, p. 11) and has been found, for example, in Ok Ruhtinassalmi on a lake shore. However, like other species of *Chlaenius*, this one seems to move on later in the summer (probably after completion of breeding) to drier, meadow-like soil (S.E.Z. 1852, p. 136).

### Biology

Nothing is known about the periods of development.

### Dynamics

Wings fully developed, and the insect is certainly an adept flier. The record of four individuals on the seashore in Pomerania (S.E.Z. 1915, p. 211) indicates transport by wind. The absolutely sporadic occurrence of the species in the western part of its total area is quite characteristic of a transmigrating highly vagile insect.

### Fossil Records

Skå, late glacial (HNR 1933, p. 141). Holstein, interglacial (Beyle 1901, p. 203). Bavaria, glacial (FLH 1884, p. 4).

\**Chlaenius nigricornis* Fbr.

### Distribution

*Sweden:* In southern and central Sweden rather continuously but not uniformly

distributed. In the large central Swedish lake region, parts of Skå, the Göteborg region, and on Öld and Gtl it is more frequent than in the regions between.  
 374 Both on the western coast (Boh) and the eastern coast (Små, Upi) at least apparent gaps in distribution discernible. Northernmost localities: Vrm Vingång, 1933 (Palm and LTH 1937, p. 120!); Dlr Leksand, 1918 (TGR, VA!); Rättvik (GRV, LF!); Gst Storvik (AND, LF); Gävle, Ångesberg (BOH, manuscript in K.V. Ak.); Hls (STH, 2 specimens; MU!), Ljusdal (SJB); Ång Undrom, June 1939, 1 specimen (BRC, RM!). Quite isolated at the northern end of the Gulf of Bothnia one locality: Nbt Neder-Kalix, Bymisträsk, 1930, dead specimen (LTH and Palm 1934, p. 41!).

*Norway:* Only in the southeast but rather widely distributed. Delimiting localities toward the west and north: 3 Larvik (NTV 1916, p. 18; MO!); 16 Hiterdal, Tinsand (SHY 1879, p. 20; HLS 1891a, p. 13); 13 Ringeby; 12 Hamar (SHY l.c.); 10 Kongsvinger (SHY l.c.).

*Finland:* In southern and central Finland distributed continuously and apparently without gaps; also on Åland (MH!) and Al Kökar (GRQ, coll. HLQ!); on the other hand, not recorded to date on the islands in the Gulf of Finland. Northernmost localities: St Ahlainen (WKS, MH!); Tb Virrat (KNG); Sb Kuopio (ENW, MH!); Tb Kontiolahti, 1942, 5 specimens (LBG!).

*Russian sector:* Only in southern Karelia, five localities, north as far as Kn Vornova (Kivatsch) (SBJ 1873, p. 125; MH!).

*Adjacent regions:* In Denmark widely distributed (also on Bornholm) but not frequent (West 1940, p. 21). Estonia, rather widely distributed, also on Ösel (SUM 1931; HAB in litt.). Latvia (ULN 1884; LBÅ 1932). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 345), also Ireland (JHS and HLB 1902, p. 565).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 100), southern Italy (LUI 1929, p. 85), Greece, and Crete (APF 1904, p. 158). Asia Minor and the Caucasus (according to CKI 1927–1933, p. 980). Turkmenia (HEY 1880–1881, p. 23). Siberia (among others, SBJ 1880, p. 41; RM!), east as far as Baikal (HEY l.c.).

## Ecology

On loamy or loamy-sandy banks rich in vegetation, with firm soil, along stagnant or slow-flowing bodies of fresh water, especially on larger eutrophic lakes. Vegetation usually consists of larger *Carex* plants, but usually with bald patches in between, where the insect prefers to stay under debris washed ashore or under pieces of wood. Highly humidity-loving and lives close to the water line,  
 375 often together with *Agonum marginatum*. In Germany also in humid, swampy meadows situated some distance from water (Dahl 1928, p. 182; NBG 1933, p. 59).

### Biology

Swedish catches: II: 1; III: 1; IV: 3; V: 30; VI: 35; VII: 12; VIII: 13; IX: 4. In Denmark a real maximum abundance recorded in May, and numerous larvae found from the end of May to the end of August (LRS 1939, p. 345). Immature beetles found on August 10 (Gtl) and August 20 (Skå). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight observations: Ik Terijoki (PRT); Hungary (HST, E.N. 1876, p. 79). Nine individuals have been found in sea drift in southwestern Finland (PME 1944, p. 38).

### Variation

The legs in this species are either black (*forma typica*) or (especially the femora) yellowish-red ("var. *melanocornis* Dej."); in the latter case the first antennal segment is usually much paler. In Scandinavia both forms occur together, in Finland only the pale form is known; intermediate forms are frequent in Sweden.

### Fossil Record

Skå, postglacial (HNR 1933, p. 141).

*Chlaenius nitidulus* Schrank.: This species was recorded by GÜN from Olonetsk province, but cannot be considered as certainly established in our region (PPP 1899a, p. 4). In Denmark, one individual each from Lolland and Bornholm, occurrence probably accidental (West 1940, p. 21). Also in Latvia (MIK 1905; LCK 1927).

\**Chlaenius quadrisulcatus* Payk.

(nec III., *caelatus* Web., *sulcicollis* female Payk.)

### Distribution

*Sweden*: Very rare and occurrence sporadic except in the Jönköping region. Some specimens in various collections originate from the early period and their labels bear only the province. Skå Ringsjön (Roth, according to THS 1859, p. 273; 1 specimen, coll. THS, ML! 1 specimen, "1878" coll. TIM, LU!), Stehag, Fairyhill, May 1882, 1 specimen (MLC, HM!). Små (leg.? RM!), Diö, July 10, 1941, 1 specimen (CHR!); Jönköping, 1905, (ELM, E.T. 1907, p. 30), 376 1913 (leg.?, MG!), August 15, 1919 (leg.?, RM!), Munksjön and bank of Vätter, near Rosenlund, 1872, 3 specimens (GAD, E.T. 1881, p. 211), on a sandy island

with a growth of pines in the Ljungarum swamp, May 1913, 8 specimens, flying among the trees (WSL in litt.; 1 specimen, LJ! 1 specimen, coll. LTH); Tranås, on the Svartån River, September 22, 1940, 2 specimens (LGN, 1 specimen, coll. LTH). Öld (leg.?, MG!). Compare "pluries lectus" (GYL 1810, p. 130, "*sulcicollis femina*"). Ögl (Th. Ekman, coll. PST, SU!).

Doubtful: Gtl, 1 specimen (PAY 1790, p. 110; type).

Norway: Absent.

Finland: First discovered in 1931 (N.E. 1932, p. 67) and found only in the Isthmus of Karelia, two localities: Ik Muolaa (several collectors!); Ka Heinjoki (S.H.A. 1936, p. 149!). PME and PFF collected the species in both localities in large numbers (altogether about 50 specimens).

Russian sector: No records.

Adjacent regions: From Denmark only three old specimens, one from Falster, the other two from Copenhagen region (West 1940, p. 22). Estonia, Werro (SDL 1872, 1891); not known in Latvia. Leningrad region (OBT 1876).

Total area: Palearctic species. In Europe markedly northeastern, west as far as Hamburg and Elsass (but not found in the present century; HOR 1941, p. 197). South as far as Poland (LMN 1913, p. 56). In European Russia found only in Leningrad region to the best of my knowledge. Siberia, Amur (HEY 1893, p. 27), Ussuri (MDL 1931, p. 4).

### Ecology

Like the other species of *Chlaenius*, this one is also a swamp animal that has been found, for example, in large numbers at high water on the bank of the Oder (E.B. 1893, p. 49). However, in summer it seems to leave the breeding place in search of drier, sandy localities; near Stettin found on dry meadow soil (S.E.Z. 1856, p. 189), in Silesia in pine forests (LTZ 1885–1892, p. 21); in southeastern Finland found by PME and PFF (in litt.) in large numbers from June to August on dry sandy soil. Numerous flying beetles sighted near Små Jönköping in May, presumably moving from their place of hibernation to the breeding site.

### Biology

In our region the catches are distributed to every month from May to September. In Sweden most (9) of the dated specimens were collected in May. LRS (1939, p. 424) rightly assumes that this species is a spring breeder, hibernating as an adult.



## Dynamics

Wings fully developed; the beetle is certainly a very good flier. Numerous flying beetles seen near Små Jönköping (see above).

\**Chlaenius sulcicollis* Payk.

## Distribution

*Sweden*: Very rare, found only in the southeast. Skå (Erson, 3 specimens, MG!), Äsperöd, on the sea (ZTT, according to THS 1857, p. 55; 1859, p. 273); Ystad, May 9, 1911 (AMM, ML!), Ystad region, at the edge of a vegetation-rich swamp, around 1910, 1 specimen (Palm!). Öld (leg.?, MG! Lundell, coll. WRN), "3 specimens under a stone" (BOH, according to THS 1857, p. 55, 1859, p. 273; 3 specimens, RM!).

Doubtful: Små (LJG, according to THS 1859, p. 273; no voucher specimen). Gtl (BOH, according to THS 1859, p. 273; no voucher specimen and no mention in the detailed accounts of the journey by BOH 1849, 1850, 1867. In the older edition THS 1857, p. 55, B. Fries was mentioned as the collector).

Erroneous: Hls (GLL 1896, p. 32; no voucher specimen).

*Norway*: Absent.

*Finland*: First discovered in 1934 (N.E. 1936, p. 30) and only in the extreme southwest, two localities: Nl Hangö, Täcktom-träsk, 1934, 1 specimen (LBÅ); Tvärminne, 1939, 1 specimen (PME, S.H.A. 1940, p. 81), Brännskär, June 13, 1935, 1 specimen (Frey 1937, p. 425; MH!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark rare, only one locality in Jylland, several localities on the islands, including Bornholm (West 1940, p. 22). Estonia, only near Dorpat (SUM, according to HAB) and in Wieck (SDL 1872). Latvia (ULN 1884; LCK and MIK 1939; LCK in litt.). Leningrad region (BSK 1922, p. 55). Not found on the British Isles.

*Total area*: Palearctic species. In Europe predominantly eastern, south as far as southern France (accidental, DEV 1935, p. 36), central Italy (LUI 1929, p. 85), Macedonia (SZM, C.C. 1928, p. 46). In Russia north at least as far as Yaroslav (SEM 1898, p. 80). Siberia (HEY 1880–1881, p. 23; JAC 1905–1908, p. 316), east as far as Ussuri (MDL 1931, p. 4).

## Ecology

Mode of life corresponds well with that of *quadrisulcatus*, and hence partly occurs in swampy terrain, for example, on the Oder (E.B. 1929, p. 49), in Bavaria in a peat bog (E.B. 1934, p. 107), partly found in both winter and summer (at any rate probably the breeding time) on drier soil, in meadows, or in pine

forests (S.E.Z. 1852, p. 136; 1856, p. 189) together with *tristis* (E.B. 1934, p. 107). Its occurrence on the sea is certainly accidental (see below).

### Biology

Since numerous beetles were found near Stettin in winter hibernation (S.E.Z., l.c.), one may agree with LRS (1939, p. 424) that breeding takes place in spring and hibernation in the adult stage.

### Dynamics

Wings fully developed. Many beetles observed in flight near Stettin (E.B. 1929, p. 49). Accidental occurrence on the seashore has been reported many times (West 1940, p. 22; LNZ 1857, p. 11; S.E.Z. 1891, p. 79) and one individual was found in sea drift in southwestern Finland (Frey 1937, p. 436). The accidental and sporadic occurrence of this species, especially in western Europe, has been reported many times (see DEV 1935, p. 36; HOR 1941, p. 196).

### Fossil Record

Russia (Sukatscheff 1906,<sup>23</sup> according to HNR in litt.).

\**Chlaenius tristis* Schall.  
(*holosericeus* Fbr.)

### Distribution

*Sweden*: Usually only sporadic but often occurs in modest numbers. There are three separate areas. I. Southeast: In Skå many localities, north as far as Hallands-Väderö, June 5, 1938, 1 specimen (BRK, ML!) and Yngsjö, June 8, 1941 (Palm). Ble (leg.?, 6 specimens, coll. Roth. ML!), Små (BOH, RM!), Växjö (RGS!), Råppe, May 3, 1914 (BRD!); Kalmar (HGL, coll. JNS! AHT, 379 VA!); Bankeberg (HGL, coll. JNS!). Öld (BOH, RM! FHR, VA!), Hornsjön, June 26, 1920, 1 specimen (JNS 1922!); Grankullavik, June 6, 1943, 1 specimen (BRK!). Gtl (LPA, VA! Schwan, according to JNS), Vamlingbo, June 6, 1934 (LOH!); Fardume (BOH 1849, p. 200); Sandön (MJB, VA!). II. Eastern central Sweden, especially in the Mälars region. Delimiting localities: Ögl Tåkern, Väversunda (JNS!); Vgl Hornborgasjön, March 20, 1938, 1 specimen (WGS, ML!); Otterbäcken, bank of Väner, June 11, 1936, 5 specimens (LTH); Vrm Visnum, May 1943, several specimens (WRN); Sdm Sparreholm (SDN, 2 specimens, MG!); Österhaninge, Sandemar, several specimens (FLK, ML!); Vst Kvicksund, 1 specimen (KHK!); Västerås (SDN, SLL, several specimens

<sup>23</sup>Unfortunately this work was not available to me so nothing can be said about the exact locality or age of the fossil.

and collections!); Upl Uppsala region (several collectors), Grisslehamn, on the sea, June 24, 1936, 1 specimen (LTH). III. Single record: Mdp Alnön, June 1937, 1 specimen (BRC, RM!).

*Norway*: Only three localities in the southeast: 1 Hvaler, Arekilen; 3 Fiskum, Hegstadmyra (N.E.T. 1920, p. 60); 4 Kragerö, Skåtøy, May 17 (HLS 1891a, p. 13; ULL 1899, p. 296).

*Finland*: Very local, generally rare, and occurs only in the south. In Al two localities (several collectors! LBÅ 1924a, p. 31!). In the southwest more widely distributed, north as far as St Björneborg (LMK, MH!), east as far as Ta Vanaja (WEG) and Ab Lojo (several collectors!). Then near Ka Svensksund (SBC 1834, p. 233) and on Hogland in the Gulf of Finland (HLL). In the southeast six localities (several collectors!), west as far as Ka Viborg (FA), north as far as Sa Joutseno (BLQ).

*Russian sector*: Sv Gorki (Ballion, MA!); Gumbaritsa, 1943 (PFF).

*Adjacent regions*: In Denmark rare and found only on the islands, including Bornholm (West 1940, p. 21). In eastern Estonia (HAB in litt.); Latvia (ULN 1884; LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876; BSK 1922). British Isles (Joy 1932, p. 344), also Ireland (JHS and HLB 1902, p. 565).

*Total area*: Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 101), Corsica (DEV 1935, p. 36), southern Italy, Sardinia, Sicily (LUI 1929, p. 85), Greece (OTZ 1886, p. 207). Northern Africa (BED 1895–1914, p. 96). Asia Minor (BOD 1927a, pp. 21, 46). The Caucasus (according to CKI 1927–1933, p. 985). Turkmenia and western Turkestan (HEY 1880–1881, p. 22). Siberia (among others, SBJ 1880, p. 41; RM!), east as far as Amur (HEY 1893, p. 27) and Ussuri (MDL 1931, p. 4).

### Ecology

380 Exclusively a riparian species, living at richly overgrown shores of eutrophic, usually larger, bodies of stagnant water. Usually on softer soil than *nigricornis*, e.g., quaking land†, gyttja††, or especially moss-rich places (in our region never in *Sphagnum*, which is said to be the case in Bavaria; HOR 1941, p. 195). Highly humidity-loving, occurring in the immediate vicinity of water. In Germany also in peat ditches, successive species here (B.E.Z. 1861, p. 190): *Oodes helopioides* and *Pterostichus aterrimus* (also in Silesia; PLZ 1939, p. 5). On *Phragmites* quaking land near Upl Djursholm, Ösbysjön, both the foregoing species found together with *tristis*; near Vgl Otterbäcken, however, on more solid mossy ground where *Blethisa*, *Elaphrus uliginosus*, *Panagaeus crux-major*, and *C. nigricornis* occur. Like *quadrisulcatus* and *sulcicollis*, in the Stettin re-

†(cf. page 49; suppl. scient.-edit.).

††(cf. page 69; suppl. scient. edit.).

gion this species also hibernates in winter in a sandy pine grove (S.E.Z. 1856, p. 189).

### Biology

Swedish catches: III: 1; IV: 1; V: 9; VI: 18; VII: 3; VIII: 5. In Denmark very distinct maximum abundance in May (LRS 1939, p. 345). Near Upl Ösbysjön I found no larvae on July 13, 1942, nor adults on July 27, 1941 and July 31, 1942. Immature beetles: Al Saltvik, July 7, 1936 (KNG!). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Upon exposure to the sun, two beetles were induced to flight (Upl Djursholm, June 29, 1942, LTH). Other flight observations: Provence (CAI 1908, p. 147); Podolia (PJT, E.A. 1929, p. 455). Several individuals in sea drift in southwestern Finland (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 38). Its repeated occurrence on the seashore (West 1940, p. 21; Dahl 1928, p. 181) is certainly a case of individuals that have drifted.

### Fossil Record

Doggerbank, "moor-log" (Bell 1922, p. 46), postglacial (see LTH 1935b, pp. 611 ff.).

### \**Chlaenius vestitus* Payk.

#### Distribution

*Sweden*: Certainly established only in Skå, with eight localities in the southern half: Sandhammaren, on the sea, June 27, 1931, 2 specimens (Palm!); Trälleborg, at least since 1861 (numerous specimens, several collectors!); 381 Håslöv, May 1885 (PTT, RM!); Lomma 1941, 1942 (Palm! KMN, ML!); Lund (several collectors! MCK 1835, p. 3; THS 1859, p. 272); Bosjökloster, among others 1866, 1868 (THS l.c.; ML! MG! HM! POR, LJ! Not found again in the present century); Hälsingborg (MLG 1863, p. 36), July 1891 (VNS, 2 specimens, ML!); Farhult (WLG, 1 specimen, MM!).

Doubtful: Skå Årup (GAD, LJ! Compare *Harpalus calceatus* and *Zabrus*). Öld (ÖST, 1 specimen, MG! According to a verbal communication by ÖST, found near Vickleby; however, his information is not very reliable).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark one locality in southern Jylland; on the islands (including Bornholm) more widely distributed but rare (West 1940,



p. 22). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Not found in Leningrad region. British Isles (Joy 1932, p. 344), also Ireland (JHS and HLB 1902, p. 565).

*Total area:* Palearctic species. In Europe south as far as southern Spain and the Balearic Islands (FUE 1919, p. 100), Corsica (DEV 1935, p. 35), southern Italy, Sardinia, Sicily (LUI 1929, p. 85), Greece, and Crete (OTZ 1886, p. 207). In Russia north as far as Yaroslav (JAC 1905–1908, p. 314). Northern Africa (BED 1895–1914, p. 97). Asia Minor; Syria; Cyprus (APF 1904, p. 157). Iran (BOD 1927c, p. 16). The Caucasus (CHD 1846, p. 115; SDR and LDR 1878, p. 66). Kirgizia (HEY 1880–1881, p. 23). Western Siberia (HEY l.c.; JAC l.c.).

### Ecology

Most of the Swedish specimens have been found on the vegetation-rich, loamy banks of small puddles, partly filled with dirty water that heats up in summer. In Central Europe also often found at very small bodies of water (see SDT 1870, p. 410; Wolf 1938, p. 362), as well as at lakes and river banks (see SDT 1841, p. 267; RTT 1870, p. 7; KTT 1873–1874, p. 190; NBG 1933, p. 60; JEA 1941–1942, p. 973). Its predilection for loam or “mud” has been emphasized many times (Dahl 1928, p. 181; NBG l.c.; GRD 1937, p. 50; E.M.M. 1925, p. 143). In the Leipzig region, *Omophron limbatum* has been mentioned as the successive species (DTZ 1938, p. 45).

### Biology

The few dated Swedish specimens are distributed as follows: IV: 1; V: 9; VI: 16; VII: 13; VIII: 0; IX: 2. The figures from Denmark (LRS 1939, p. 346) project quite another picture, with maximum abundance in July and September. LRS (1939, p. 424) thus concludes that the species presumably hibernates in the larval stage; however, one larva in his material is dated from the end of June. Furthermore, there are definite records from Central Europe concerning larvae found in summer, pupae in August and adults in winter (BLK 1925, p. 21; BUR 1939, p. 164). One must assume that LRS has made a mistake and that hibernation in the adult stage is normal.

### Dynamics

Wings fully developed and certainly functional. However, no flight observations exist as far as I know.

\**Cicindela campestris* L.

Distribution

*Sweden:* Apparently absent from the southern and eastern coasts of Skå, but otherwise distributed everywhere and frequent in southern and central Sweden, although sometimes overlooked as a pronounced spring form. Northward becomes scarcer and reaches neither the fjeld region nor the northern end of the Gulf of Bothnia. Northernmost localities: Dlr Särna (AND, LF), 1927 (FRL!); Idre (Bergström); Hls Gnarp, 1936 (ERL!); Delsbo (ROS, ML!); Mdp (TFV, VA!), Liden (ADZ, LD); Jtl Ragunda (FRI, VA!); Ång Undrom and Mo, June 1939, altogether 7 specimens (BRC, RM!); Vbt ("Botnia occ. frequentim," ZTT 1828, p. 2; 1840, p. 20), Umeå, 1936, fragment (LTH); Nbt Boden, Degerberg, June 1941, several specimens on sandy paths (KMK); Lyl Sorsele, Gargnäs, 1919, several specimens on the edge of a sandy field (GTZ in litt.).

*Norway:* Except for the fjelds, found throughout southern Norway, north, as far as 28 Snåsa (SHY). Farther north found only in the coastal region as far as 31 Beieren (found many times; SPS 1888–1889, p. 92); Bodö (WRL); additionally, one isolated locality: 35 Tromsdal, 1883, several specimens (SPS l.c.; 1889, p. 207).

*Finland:* South of latitude 64° N certainly distributed everywhere; the gap in parts of Om, Tb, and Sb is without doubt only apparent. Farther north there are only five localities: Ob Uleåborg (Ehrström, MH!); Ok Kajana (ARO, MH!); Sotkamo (PHJ); Ruhtinassalmi (SSK, several specimens, MÅ!); Ks Kuusamo (SBJ 1873, p. 58; MKL, MH!).

*Russian sector:* Only five localities in southern Karelia, north as far as Ka Jalguba (PPP 1899a, p. 7).

383 *Adjacent regions:* In Denmark frequent everywhere (West 1940, p. 1). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 322), also Ireland (JHS and HLB 1902, p. 555).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1918, p. 10), Corsica (DEV 1935, p. 15), southern Italy, Sicily, Malta (LUI 1929, p. 24), Greece (OTZ 1886, p. 204). In the northeast extends into the Arkhangel'sk region (PPP 1907c, p. 303). Northern Africa (BED 1895–1914, p. 10). Asia Minor (ECH 1922, p. 29; Horn 1926, p. 224). The Caucasus (ECH 1930b, p. 214; Horn l.c.). Siberia (among others, SBJ 1880, p. 5), east as far as Trans-Baikal (HEY 1880–1881, p. 1) and Lena (PPP 1906b, p. 14; Horn l.c.).

Ecology

On open, more or less hard soil of various kinds: loam, sand, gravel, peat, etc.

Especially on paths, tracks, farms, in gravel pits, at forest fringes, and in other sun exposed places. Usually on bald patches among grass, *Calluna*, and other vegetation. Dry to fairly humid soil. This is decidedly the most eurytopic of our four species of *Cicindela*. KRG (1932, p. 146) has experimentally proved that it is less dependent on heat than *maritima* and *silvatica*. In Central Europe it is likewise eurytopic (see BRN and PTZ 1933, p. 236) and even frequent on peat soil in high moors (Peus 1928, p. 576).

### Biology

A pronounced spring species. Distribution of southern Swedish catches: III: 1; IV: 16; V: 75; VI: 67; VII: 32; VIII: 12; IX: 2. Corresponding figures available for Denmark (LRS 1940). Copulation observed on May 23 (Gtl); numerous immature beetles July 24, 1937 (Upl Djurö), most of which were extracted from the pupal case, but some had emerged on their own. Similar situation in southern Norway on August 25, 1897 (E.T. 1899, p. 293). Usually, however, the newly emerged beetle remains in the soil certainly until the following spring. On the other hand larvae hibernate, and their development requires more than a year (LRS l.c.). The beetle hunts for ants in particular (E.B. 1932, p. 90), among others *Formica fusca* L. (Upl Djurö, June 1937, LTH). The larva is an extremely polyphagous insect predator (BLK 1925, p. 4; BUR 1939, p. 20).

### Dynamics

The beetle is a very active flier during sunshine, and utilizes its wings not only when threatened but also in hunting for food. However, its flights are comparatively short and usually quite close to the ground.

### Variation

Pattern of the elytra highly variable (and to a lesser extent, other color characteristics also). Sydow (E.B. 1934) has surveyed the aberrations. At least in our region none exhibit geographic correlation.

### Fossil Records

Denmark, postglacial (HNR 1933, p. 122). England, undetermined age (Bell 1922, p. 46).

\**Cicindela hybrida* L.

Distribution

(map in MDL 1935, p. 289<sup>24</sup>)

*Sweden*: Predominantly a southwestern species that reaches the eastern coast only in Skå, Ble, and southern Små. Eastern and northern boundaries represented by the following localities: Små Vassmolösa, numerous (GTZ). Virserum, June 1910 (JNS!); Rumsquilla, 1 specimen (WLE); Ögl Mjölby, 1879 (NER, coll. JNS!); Malmslätt, 1911, frequent (WLE!); Nässja, bank of Vätter, 1930, 1 specimen (Palm); Vgl Skara region since 1880 (many collectors!); Kinnekulle (MRT, 2 specimens, MG!); Vrm (MLB, VA!), Grava, Almar, shore of Klarälven, July 16, 1939, several specimens (H. Lundström, coll. WRN!), June 22, 1943, numerous (BGW!); Boh Lane-Herrestad, Källdalen, 1938 (KLF).

Doubtful: Vst (VYL, 3 specimens, MU!). In the Catalogus (1939) "V" mistakenly shown in the 7th (= Vst) instead of the 5th (= Vgl) column, due to a printing error.

Erroneous: Lapland (Portin, according to ZTT 1828, p. 2; 1840, p. 20; GLL 1896, p. 1).

*Norway*: Exclusively in the southeast and only west of Oslo Fjord, with eight localities situated in this narrow belt: 16 Hiterdal (HLS 1891a, p. 7); Sauerelva (MST); 15 Kongsberg, frequent (HLS l.c.; MST); Skollenborg (MST); 2 Drammen (SIE 1875, p. 77); Hokksund (SHY 1879, p. 11); Norderhov in Ringerike (SIE l.c.). Farther north one somewhat isolated locality: 15 Nes in Hallingdal (SIE l.c.).

*Finland*: Markedly southeastern species, but extends far into the interior. The area is homogeneous and continuous. Delimiting localities in west and north: Nl Esbo (PFF); Ta Heinola (LST, WST, MH!); Tb Jyväskylä (SUC, MH! FA! KRG); Su Kuopio (FBT, MH!); Tuovilanlahti (ARO, MH!), Kb Kontiolahti (ENW, MH! KRG).

Erroneous: Ok Ruhtinassalmi (SSK, several specimens, MÅ! Compare footnote with *Bembidion argenteolum*).

*Russian sector*: Only in the south, six localities (several collectors!), north as far as Kn Kenjärvi, 1942 (SAA! KNG!); Kosmosero (PPP 1899a, p. 7).

*Adjacent regions*: In Denmark widely distributed (also on Bornholm) and not rare (West 1940, p. 1). Estonia, widely distributed and frequent especially in the southeast, but not on the islands (HAB in litt.). Latvia, including Kurland (ULN 1884; LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 322).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 9), southern Italy (LUI 1929, p. 24), Bosnia (Horn 1926, p. 213). In

<sup>24</sup>This map is very incomplete. For example, there are no localities shown for northern Europe.



the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 303). Asia Minor and the Caucasus (MDL 1935, p. 289). Kirgizia and western Turkestan (HEY 1880–1881, p. 1). Siberia, at least as far as Trans-Baikal (SBJ 1880, p. 5; PPP 1906b, p. 14; MDL l.c.).

### Ecology

Exclusively on dry, sun exposed, more or less barren sand or fine gravel. Partly in sand and gravel pits or on similar scarps, partly at the sea, more seldom at lakes or rivers, but far removed from water. It may occur together with *maritima* in riparian biotopes. In our region it is found almost constantly on southern slopes and generally very warm places. In Central Europe also in flat sandy fields overgrown, for example, with *Calluna*, and even on sandy cultivated fields (SDT 1841, p. 90; HOR 1941, p. 30).

### Biology

Swedish catches: IV: 2; V: 16; VI: 26; VII: 20; VIII: 9; IX: 2. It is in no way as pronounced a spring insect as *campestris*, as further evidenced by the data from Denmark (LRS 1940). Several immature beetles between July 15 (Små) and August 15 (Små). Hibernation takes place in the adult stage and concomitantly the stage of half-grown larvae (SLK, E.M. 1899, p. 51; LRS l.c.).

### Dynamics

The species is an even more adept flier than *campestris* and frequently makes higher and longer flights.

### Variation

According to MDL (1935) several races are distinguishable in this species. In our region it is apparently homogeneous (*forma typica*).

\**Cicindela maritima* Dej.

### Distribution

(map in MDL 1936, p. 26)

*Sweden*: There are three completely separate areas. I. Extreme southwest on the coast of Skå and Hll between Skå Sandhammaren region (THS 1869–1895, p. 528; MB! 1942, several specimens CHR!) and Hll Stafsinge (frequent; RGS, E.T. 1913, p. 231!), but with a gap in Skå between Skanör (THS, MG! Roth, ML!) and Angelholm (BRK). II. On the rivers of central Sweden and southern Norrland: Vrm (various old records), Deje, 1933 (Palm and LTH 1937,

p. 115!); Uddeholm (leg.?, old specimen, VA!). Dlr (BOH, 4 specimens, RM! 1 specimen, coll. JNS!), Mora, southern bank of Orsasjön, June 24, 1932, in large numbers, June 1933, sparse (KHG!). Mdp, delta of Indalsälven, June 1937, 12 specimens (BRC, RM!); Liden (ADZ, 3 specimens, LD!). Jtl Ragunda (FRI, SLL, several specimens, several collectors!). Ång Mo, Moliden, June 1939, 1 specimen (BRC, RM!). III. On the coast of Nbt: Piteå, Renön, June 6, 1933 (WBL, 6 specimens, ML!); Bälänge, Sandnäset, bank of Lule-älv, August 7, 1940, 1 specimen (LTH); Luleå Skärgård, Sandön, Klubbviken, July 21, 1938, several specimens, July 7, 1939, larvae (LTH). It is possible but not probable that areas II and III are connected.

Doubtful: "Lapponia" (WBG, RM!).

*Norway*: Two completely separate areas. I. Eastern half of southern Norway, on large rivers, between 2 Modum (ESM), 10 Kongsvinger (MST) and the Trondheim region continuously distributed but highly local. Northernmost localities: 20 Surnadal (LYS); 27 Sokna in Stören (N.E.T. 1937, p. 143); 28 Verdal, Nes, July 1840 (ZTT, ML!). II. Two localities in the extreme north: 38 Alta, 1910; 39 Karasjok, 1908; numerous at both places (MST, N.E.T. 1923, p. 284).

387 *Finland*: Distribution with very little continuity. I. Four localities in the southwest. Ab Kakserta (BFF, MH!); Nl Tvärminne and Lappvik (several collectors!); Esbo (Montin, MH!). II. In the southeast: Several localities in the Isthmus of Karelia, as well as on the islands in the Gulf of Finland (except Hogland). North as far as Ik Metsäpirtti (STN! KRG). III. Two localities in the central inland: Sb Kuopio (FBT, MH!). Kb Kontiolahti, Jokiniemi, July 1931 (KRG 1932, p. 248). IV. On the Gulf of Bothnia five localities between Om Jakobstad (several collectors!) and Ob Hailuoto (WUO, MH! KRG!) and Uleåborg (NYL, MH!). V. In the north on large rivers more widely distributed, north as far as Li Ivalo, Kyrö (PPP 1905, p. 84) and Lp Lutto (PFF, N.E. 1942, p. 65); south as far as Ob Rovaniemi (KNG!); Kemijärvi (SBJ 1873, p. 59; MH!); Ks Kuusamo (several collectors!).

Doubtful: Ta Padasjoki (EHN, MÅ! There is also *Amara torrida* with the same label, which at any rate is erroneous).

*Russian sector*: Only near Lt Nuorti (I. Forsius, MH!).

*Adjacent regions*: In Denmark rare: three localities in southern Jylland, farther on Anholt Island in the Kattegatt, and one locality on Bornholm (West 1940, p. 1). In Estonia (HAB in litt.), partly at the coast (also Palm!), including Ösel (LCK in litt.), partly on Peipus (also HDS!), finally at Lake Wirzjerv (MHL and SDG 1920). In Latvia at the coast as well as on the Livonian Aa (LBÅ 1932; LCK in litt.). Leningrad region (OBT 1876). British Isles (Beare 1930, p. 1; Joy 1932, p. 322).

*Total area*: Palearctic species. In Central Europe exclusively at the coast, south as far as Bretagne (DEV 1935, p. 15); isolated in northern Spain and Portugal (FUE 1918, p. 10). In eastern Europe north at least as far as Yaroslav

(SEM 1898, p. 79), east as far as Volga (MDL 1936, p. 28). Southern Siberia; northern Mongolia; Kamchatka (MDL l.c.).

### Ecology

Exclusively a riparian species, which lives stenotopically on dry, almost or completely barren quicksand, partly at the sea and partly at rivers, less often at lakes (e.g., Dlr Mora), and always at some distance from water. The salt content of the soil is inconsequential; it is thus wrong to speak of a "halophilous" species (even in Bur 1939, p. 22) or even a "halobiont" (HOR 1941, p. 31). First and foremost the fineness of the sand grains is a decisive factor (KRG 1932, p. 163). The larvae live at more humid places than the adults and hence usually in the vicinity of water (MST, N.E.T. 1923, p. 287; KRG l.c.; also  
388 sighted near Nbt Luleå, Sandön). A vivid description of a river-bank biotope in northernmost Norway has been given by MST (l.c.); the biotopes of the quicksand coasts of Finland have been detailed by KRG (l.c.). The beetle is highly heliophilous and its preference in this respect readily apparent (KRG 1932, p. 146; 1937, p. 299).

### Biology

Distribution of the few dated Swedish catches: V: 3; VI: 10; VII: 7; VIII: 3. In Denmark maximum abundance in May (LRS 1940). Together with half-grown larvae certainly hibernates as an adult, as assumed by LRS (l.c.). KRG (in litt.) established during field studies in Finland that the following insects serve as prey: *Crambus fascelinellus* Hb., *Anerastia lotella* Hb., *Tetanops myopina* Fall., and *Hylemyia candens* Zett. In Germany cocinellids were presumed as prey (E.B. 1911, p. 160) but never proven as such according to BUR (1939, p. 23). For other biological details, see LNG (1929, pp. 20 ff.).

### Dynamics

This species is an even more adept flier than *hybrida* and is very difficult to catch during hot sunshine. In spite of this, or rather because of this, it does not easily drift and sticks conservatively to suitable, often very small surfaces.

### Variation

This species (specifically and definitely distinguished from *hybrida*) comprises several races according to MDL (1936). In our region, however, it seems to be comparatively homogeneous. The name *finmarkica* Munst. (N.E.T. 1923, p. 287) was originally given solely to aberrations with an especially highly



reduced pale elytral pattern, but has been used by MDL (l.c., p. 27) for a separate northern subspecies; the latter, however, is barely differentiated and does not warrant separation from the *forma typica*.

*\*Cicindela silvatica* L.

Distribution

389 *Sweden*: Found in all provinces except Ble and Dsl, but in no way universally distributed. In southern Sweden chiefly in the west, very rare in the region of the large central Swedish lakes, and missing in the actual fjeld regions (e.g., in most of Jtl). Highest localities: Dlr Idre, Hällsjön (FRL!), Gränjesvåla (KLF); Hjd Vemdalen and Sandviken (LBL, RM! CDG); Jtl Bodsjö and Revsund (BGW); Ragunda (FRI, VA!); Åsl Åsele (ZTT 1840, p. 22); Lyl Stensele (ZTT l.c.); Sorsele, Ammarträsk (GTZ); Pil Snjerraluokta and Hornliden (H. Lundberg!); Arvidsjaur (RGS!); Lul Jockmock (BAU 1879, p. 143; WLD in litt.); Muddusjaure, 1941 (RDB, ML!); Pålkem, 1941, numerous (WRN!); Mäntyvaara, July 30, 1938 (LTH); Nbt Över-Kalix (ÅGR!); Över-Torneå, Ruskola, August 1875 (LLJ, MU!).

*Norway*: I. In southern Norway distributed almost everywhere, especially frequent in the east and south. In the actual western part of the country very rare, only near 7 Bergen (LPT); 18 Granvin in Hardanger (SIE 1875, p. 76); 20 Romsdal (SIE l.c.). Northernmost localities: 24 Lesjaskog (LYS); Lesja (CTT); 11 Engen in Tyllidal (SIE). II. In the extreme northeast (41) two localities: Svanvik, 1 specimen; Neiden, numerous (SPS 1888–1889, p. 93; 1894, p. 53; N.E.T. 1923, p. 283).

*Finland*: Except for the extreme northwest (Le, Li), almost uniformly distributed throughout the country. Northernmost localities: Lk Muonio (several collectors! SBJ 1873, p. 58); Kittilä (SAD, MH! KRG); Sodankylä (SUD, MH!); Lp Lutto (PFF, N.E. 1942, p. 65); Yläluostari, 1938 (STN).

*Russian sector*: In the southern part of Kola Peninsula east as far as Lv Varsuga (PPP 1905, p. 84; MH!). In Karelia scattered localities, south as far as Sv Gumbaritsa (PFF).

*Adjacent regions*: In Denmark rather rare but widely distributed, also on Bornholm (West 1940, p. 1). Estonia, including Ösel (HAB 1936a) and Dagö (HAB in litt.). Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 322).

*Total area*: Palearctic species. In Europe south as far as eastern France (DEV 1935, p. 15), southern Germany (HOR 1941, p. 27), Hungary (KTY 1900, p. 21); isolated in northern Spain (FUE 1918, p. 9). Doubtful in Italy (PTA 1923, p. 37; LUI 1929, p. 1007). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 303). Asia Minor (APF 1904, p. 4). The Caucasus (Horn 1926, p. 209). Kirgizia and western Turkestan (HEY 1880–1881, p. 2). Siberia (among others, SBJ 1880, p. 5), east as far as Amur (HEY l.c.)



and Lena (PPP 1906b, p. 14). Northern Mongolia; Altai (Horn l.c.). Sakhalin (Horn l.c.).

### Ecology

A characteristic insect of rough, sandy, very dry open pine heaths. Ground vegetation consists chiefly of *Calluna*, *Empetrum*, and *Cladonia*, with bald sandy patches in between. Appears to have a special predilection for places freshly burned by forest fires (also in Germany: Peus 1928, p. 575). Secondarily inhabits other sandy locations, for instance, in Norrland sandy scarps (Swedish "nipor") of rivers, sometimes unwooded *Calluna* heaths (HLS 1915, p. 6; PME, S.H.A. 1939, p. 58; West 1940, p. 1). Corresponding reports exist from the rest of Europe. The species is highly heliophilous but is somewhat less heat-requiring than *maritima* (KRG 1932, p. 147).

### Biology

Southern Swedish catches: V: 9; VI: 31; VII: 19; VIII: 7; IX: 1. Numerous larvae of various sizes were found together with adults near Ta Siikakangas (PME, S.H.A. 1939, p. 58). Hibernation certainly takes place both at the adult stage and the larval stage and breeding in early summer (LRS 1940). The beetle is a polyphagous carnivore (PME l.c.); in Central Europe its prey includes primarily ants (*Formica rufa* L.) (BLK 1925, p. 4), but also noctuids (BUR 1939, p. 24).

### Dynamics

An excellent flier, which usually flies farther and higher than other species of *Cicindela*.

*Clivina collaris* Hbst.  
(*contracta* Fourc.)

### Distribution

*Sweden*: Only near Göteborg and Stockholm. Vgl Göteborg, around an indoor greenhouse of "Trädgårdsföreningen," February 3, 1891, 2 specimens (HGL, coll. JNS and LTH), spring of 1898 (SDN, MG!). Sdm Nacka, June 15, 1929, 1 specimen (OLS!). Stockholm, May 23, 1919 (OLS!), Åsögatan, April 1901 (MJB, E.T. 1901, p. 191; 1 specimen, RM! 1 specimen, VA!), experimental field, in a garden, 1932, 1 specimen (LTH).

Doubtful: Skå (GLL 1896, p. 5; no voucher specimen). "Bohl." (leg.?, 2 specimens, coll. THS, ML! Possibly refers to the record in Göteborg).

391 No records in the rest of Fennoscandia. Wrongly mentioned for Norway (HLS 1891a, p. 12; 1915, p. 13).

*Adjacent regions:* In Denmark only a few localities on the islands; missing on Bornholm (West 1940, p. 9). In Estonia, near Odenpäh according to LCK (1927, p. 12); in eastern Latvia according to ULN (1884, p. 10). Not known in the Leningrad region as far as I know. British Isles (Joy 1932, p. 331), also Ireland the (JHS and HLB 1902, p. 563).

*Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 51), southern Italy (LUI 1929, p. 52), Bulgaria (APF 1904, p. 68). In Russia north as far as Yaroslav (JAC 1905–1908, p. 271). Asia Minor (according to CKI 1927–1933, p. 499). The Caucasus (SDR and LDR 1878, p. 64; LSH 1936, p. 139). Western Asia as far as western Turkestan (HEY 1880–1881, p. 15). The records of distribution may be partly unreliable since confusion with unbleached or rufous individuals of *fossor* occurs rather often (see HOR 1941, p. 95).

### Ecology

In our region only synanthropic, in garden soil or in greenhouses. Ecological data from Central Europe must be used with caution because of frequent confusion with *fossor*. In Denmark once found in a compost heap (West 1940, p. 9). In Germany purportedly “everywhere in humid places” (DTZ 1937, p. 56), also on “the youngest wet alluvial soil” (Dahl 1928, p. 42). In Austria stated to occur on “sandy-gravelly soil,” while *fossor* prefers “clayey-muddy” places (HEB and MEX 1933, p. 61); on the other hand in northern Germany chiefly on “heavy” soil (GRD 1937, p. 40). At any rate in Central Europe the species apparently is not synanthropic.

### Biology

Of the six dated Swedish catches, five are from the first half of the year. In Denmark too there are only a few specimens, most from April and October. LRS (1939, pp. 320, 372) concludes that like *fossor*, this species breeds in spring and hibernates as an adult, which should be correct.

### Dynamics

Wings (as seen in two Swedish specimens) fully developed. Supposedly flight has been observed in Hungary (HST, E.N. 1876, p. 79). Certainly transported by man into Sweden.

England, postglacial (Bell 1922, p. 46). Identification must be considered uncertain.

*\*Clivina fossor* L.

Distribution

*Sweden:* Uniformly distributed and very frequent throughout the country, except for northernmost Lapland (Tol.). Northernmost localities: Pil Pjeskejaure, 1925 (LTH 1935a, p. 38!); Lul Kvickjock; Randijaur; Jockmock, 1924 (LTH); Vuollerim 1941 (RDB, ML!); Pållem, 1940–1941 (LTH, WRN!); Ullatti, 1938 (LTH); Nbt Narken; Tärendö, Pajala, Erkheikki, 1938 (LTH).

*Norway:* Except for the northernmost peninsulas and the actual high fjelds, distributed throughout the country, and certainly without gaps. Northernmost localities: 36 Nordreisa (STE, MB!); 38 Alta (MST, MO!); Lakselv and Brennelv in Porsanger (according to STA); 40 Nyborg (MST).

*Finland:* Universally distributed except in the high fjelds.

*Russian sector:* On the Kola Peninsula widely but somewhat irregularly distributed, east as far as Lj Ponoj (PPP 1905, p. 87); seems to be missing from most of the northern coast. In Karelia certainly universally distributed, but with an apparent gap in the central part.

*Adjacent regions:* In Denmark frequent everywhere (West 1940, p. 9). Estonia (several collectors!); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 331), also Ireland (JHS and HLB 1902, p. 562). Shetland (West 1930, p. 74).

*Total area:* Circumpolar species. In Europe south as far as northern Spain (FUE 1918, p. 51), Corsica (DEV 1935, p. 21), southern Italy, Sardinia, Sicily (LUI 1929, p. 52), Greece (OTZ 1886, p. 206). Northeast as far as Kanin (PPP 1909, p. 5) and Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306). Asia Minor (according to CKI 1927–1933, p. 503). The Caucasus (SDR and LDR 1878, p. 64). Western Turkestan (CKI l.c.). Siberia (among others, SBJ 1880, p. 9), east as far as Kamchatka (HEY 1880–1881, p. 15). North America, probably imported (Leng 1920, p. 48).

Ecology

An extremely eurytopic species which only requires more or less solid soil that is moderate to highly moist, with vegetation that is not too tall or only  
 393 patchy. Otherwise soil conditions are significant only to the extent that the particles must be fine enough to permit the digging of tunnels. The species is missing only in pure sand (also according to PME and PFF 1943, p. 129), but seems to occur in loamy-sandy soil. Prefers loam by and large, but never avoids

peat or almost pure humus. Usually occurs at places with a preponderance of graminaceous vegetation; tolerates moderate shade but prefers open terrain. Fond of river banks but can in no way be called ripicolous. It is usually found under well-embedded stones but actually tunnels everywhere among the roots of plants. Also appears on the soil surface, especially in the evening. In Central Europe also its preference for loam has been observed (HEB and MEX 1933, p. 61; GRD 1937, p. 40). The species also extends sparsely into the lower parts of the *reg. alp.* (in Hjd up to an altitude of 850 m above sea level) and has been found on the Kola Peninsula (PPP 1905, p. 87), in northeastern Russia, western Siberia (PPP 1910a, p. 308), and in the tundra.

### Biology

Southern Swedish catches: III: 1; IV: 21; V: 94; VI: 148; VII: 68; VIII: 37; IX: 8; X: 2; XI: 2. In Denmark likewise predominantly a spring species, with larvae found at the end of May and in July and August (LRS 1939, p. 320). Numerous immature (tender) beetles found between June 29 (Dlr) and September 6 (Gtl). Spring breeder, hibernating as an adult. Near Vbt Skellefteå large numbers were found in August 1911 attacking strawberries (TGR 1912, p. 71). It might, however, be primarily carnivorous; in North America the adult *C. impressifrons* Lec. is a pest of maize, but the larvae carnivorous (BLK 1925, p. 17).

### Dynamics

Wings fully developed and functional. Flight observations: Vrm Vingång, June 13, 1933 (LTH); Lul Pållem, June 1941, 2 specimens (WRN); Germany (GRD 1937, p. 76); Hungary (HST, E.N. 1876, p. 79). In Finland the beetle was found in very large numbers in drift material on the Gulf of Finland (also in Ladoga) (Frey 1937, pp. 410, 436; PME 1944, p. 37). Elberfeld, "frequent in gas tanks" (CRN 1884, p. 10; see p. 15 above).

### Fossil Records

Skå, postglacial (HNR 1933, p. 127). Poland, glacial (MAK and SMZ 1936).

*\*Cychrus caraboides* L.  
(*rostratus* Fbr.)

### Distribution

*Sweden:* Found in all provinces but uniformly distributed only in the southern half of the country. The gap in Gst and southern Hls may only be apparent. North of latitude 64° N chiefly in the fjelds; lowest localities here: Vbt



Hällnäs, Bodarna, 1935, 2 specimens (HEQ!); Degerfors, Kulbäckslid, 1 specimen (FRL); Löfvånger, 1936, 1 specimen (LTH); Nbt Luleå, Bergnåset, June 28, 1939, 1 specimen (LTH); Lul Nelkerim, June 1843 (according to BOH, manuscript in K.V. Ak.). Northernmost localities: Lul Suorva, July 26, 1935 (Holm, coll. LTH); Tol Abisko region, Lulletjärro, just above the timber line, 1939, dead specimen (LTH).

*Norway:* In the outskirts of the western part of the country between 6 Skjold in Ryfylke (N.E.T. 1927, p. 217) and 26 Hitra (N.E.T. 1937, p. 144) apparently absent, and also not found to date in the extreme south. Otherwise distributed throughout the country continuously but sparsely and rather unevenly. Northernmost localities: 37 Hammerfest (SPS; N.E.T. 1927, p. 217); North Cape (Weber 1916, p. 223); Honningsvåg (JEN, according to STA); 40 Tana (LYS; N.E.T. l.c.).

*Finland:* In the southwest (including Åland and the islands in between) very densely distributed; otherwise scattered, unevenly distributed localities, and usually occurs singly. On the Bothnian coast no record to date; it is still not certain whether a gap also exists on the southern coast. Delimiting localities toward the west and north: Om Vetil (NSL, N.E. 1930, p. 120); Haapavesi (HEL, NL); Ob Rovaniemi (EHN, MÅ!); Pello (MHJ, coll. GBL); Ks Salla (KNG); Lk Pallastunturi (RNK); Lp Yläluostari (LBÅ 1933, p. 111!); Pummanki (HLL, MH! LNN, MÅ!).

*Russian sector:* Solitary localities along the entire coast of Kola Peninsula, also in the western inland (PPP 1905, p. 85!). In Karelia found to date only in the south, six localities, north as far as Kn Perguba (PPP 1899a, p. 7; MH!).

*Adjacent regions:* In Denmark widely distributed, also on Bornholm, and rather frequent (West 1940, p. 2). Estonia, including Ösel (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 555).

395 *Total area:* Solely European species. South as far as northern Spain (FUE 1918, p. 19), northern Italy (LUI 1929, p. 28), Yugoslavia (APF 1904, p. 47). East as far as Kanin (PPP 1909, p. 4), Mezen region (PPP 1908, p. 4), Vyatka and Kiev (JAC 1905–1908, p. 206, southern Poland (LMN 1893, p. 342). According to HEY (1880–1881, p. 5) found in Turkmenia, which is certainly erroneous (not accepted by JAC, l.c.).

### Ecology

A pronounced forest species, in deciduous or mixed forests with considerable soil moisture and a distinct humus layer, often in very dark places. The species has a predilection for living under moss and the bark of old stumps. In Skå especially in beech forests. In the fjelds the species sporadically ascends to the lower parts of the *reg. alp.* (Hjd, Pil, Lul, Tol). On the Kola Peninsula (PPP 1905, p. 85) and Kanin Peninsula (1 specimen; PPP 1909, p. 4) found in the

tundra. In Central Europe, as in our region, almost exclusively a forest species (see West 1940, p. 2; RTT 1908, p. 89; Dahl 1928, p. 21).

### Biology

Southern Swedish catches: II: 2; III: 7; IV: 14; V: 28; VI: 53; VII: 50; VIII: 37; IX: 10; X: 10; XI: 1. In Denmark larvae have been found partly at the end of April, and partly (numerous) from the end of August to November (LRS 1939, p. 316). It is thus clear that the larvae hibernate, but so do most of the adults. Since immature beetles have been found in Sweden on May 29 (Skå), and in July from July 3 (Nke) to July 17 (Små), it is not certain whether breeding takes place only in autumn, as assumed by LRS (l.c., p. 355). Further investigations are needed to ascertain whether the beetle lives for less than a year, or more. Both beetles and larvae feed on snails (BLK 1925, p. 11; BUR 1939, p. 47).

### Dynamics

Wings markedly reduced and invisible to the naked eye. Elytra fused along the suture.

### Variation

In our region there are two main forms of the species *caraboides*, namely *forma typica* and *rostratus* L., which I earlier designated respectively predominantly  
 396 northern and southern in distribution (see LTH 1942a, p. 32). Let me clarify here that subsequent studies of extensive material established that no sharp line can be drawn between the distribution of these two forms (also see SPS 1901, p. 29; E.B. 1938, p. 93).

### Fossil Records

Små and Ögl, postglacial (respectively boreal and subboreal) (SUN 1917, p. 158). Skå, postglacial; Denmark, postglacial (HNR 1933, p. 125). England, postglacial (Bell 1922, p. 46). Bavaria, glacial (FLH 1884, p. 3).

### \**Cymindis angularis* Gyll.

#### Distribution

*Sweden*: Quite predominantly a coastal species, found in the inland only in central Sweden. Along the southern Swedish coasts the distribution might well be uninterrupted and the small gaps in the map due to the rarity of the species. Only on Öld and Gtl, and the Skärgård of Göteborg is it more frequent

at some places. Northernmost coastal localities: Boh Strömstad, 1933 (LBH!), Upl Runmarö (HFS, 4 specimens, LÖ!), and Stockholm (several collectors!), and very recently collected at Torbj. Nilsson in Lilljansskogen, May 1943, 2 specimens, (!). Inland localities: Vgl Kinnekulle (BOH, according to THS 1859, p. 225; 1 specimen, RM!). Ögl Högbý, Lärketorp (ZTT, according to THS l.c.). Nke Tysslinge, Latorp (JNS, E.T. 1915, p. 203!); Örebro, 1936, 1937, 1 specimen each (JNS); Valön in Hjälmarén (JNS l.c.), Vinön (JNS). Upl Uppsala (several collectors! Also according to GLL 1896, p. 6).

*Norway*: In the south along the coast, west as far as 6 Jæren (HLS 1915, p. 34!) and 7 Bergen, Damsgård, 1872, 1 specimen (SPS 1875, p. 20; regarding the reliability of this identification, see SPS 1901, p. 32). Inland in the south-east, north as far as 14 Land (SIE 1875, p. 92); 13 Otta in Sel, August 1916 (MST, MO!); 10 Åmot (SIE l.c.).

*Erroneous*: 37 Hammerfest (STR, according to SPS 1888–1889, p. 148; see *Bembidion lampros* and *velox*).

*Finland*: Only in the southwest, where it is continuously and rather widely distributed; also on Åland and the islands lying eastward (several collectors!) and Tytärsaari in the Gulf of Finland (HLL). Delimiting localities north and east: St Ytterö (ELF); Oa Seinäjoki (PHJ); Ta Tammerfors region (several collectors!); Pälkäne (SDM, MH!); Ka Fredrikshamn (KNG). Isolated near Kb Kitee, 1940, 1 specimen (PME!).

*Russian sector*: Absent.

*Adjacent regions*: In Denmark rare, found only in Jylland and on Bornholm (West 1940, p. 51). In Estonia partly on the northern coast (and on two small islands), partly near Dorpat (SDL 1872; HAB in litt.). Latvia, Kurland (LCK and MIK 1939). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area*: Palearctic species. In Europe south as far as southeastern France (DEV 1935, p. 60), northern Italy (LUI 1929, p. 144), Austria (HOR 1941, p. 347), Hungary (KTY 1900, p. 41). Kirgizia (HEY 1880–1881, p. 20). Western Siberia (HEY l.c.; JAC 1905–1908, p. 405).

### Ecology

On firm, dry, sun-exposed soil consisting of gravel or sand, especially in coastal regions, and with low vegetation. Latter usually consists of grasses, sometimes also of *Calluna* (at least in patches). In the Alvar† of Öld and Gtl the species is characteristic of grassy parts. It has a predilection for limestone but in no way appears dependent on it. Often gregarious under larger, flat stones, and also under *Calluna*, *Thymus* and adjacent plants. In Central Europe too

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



especially on sand, e.g., the dune regions of the Baltic Sea (D.E.Z. 1914, p. 397; S.E.Z. 1915, p. 214).

### Biology

Swedish catches: IV: 8; V: 12; VI: 19; VII: 27; VIII: 16; IX: 7; X: 2. Immature beetles found from July 8 (Öld) to August 8 (Gtl). In Denmark where, oddly, comparatively few beetles have been found in June and July, larvae were found in May and June (LRS 1939, p. 349). LRS (l.c., p. 431) has assumed that the larvae hibernate, which might be true for our region also; however, a large number of adults also survive the winter.

### Dynamics

To date I have only seen brachypterous specimens, whose wings are reduced to a small, triangular rudiment about one-fifth the size of an elytron.

398

### \**Cymindis humeralis* Fourc.

#### Distribution

*Sweden*: Found only in the coastal regions of the southeast and generally very rare. Skå Hälsingborg (coll. MLC, HM!); Åsperöd (FLL, according to GYL 1810, p. 173, and THS 1859, p. 224); Torsebro, August 1904 (ROS, 1 specimen, ML!). Ble (FHR, VA!), Hällevik, July 1936 (SJB); Karlskrona, several specimens (ANK, according to THS 1867a, p. 29; 4 specimens, VA!). Små Kalmar (several collectors!); Fliseryd, May 16, 1920, 1 specimen (WLE!). Öld, numerous collectors and localities (!), at some places found in moderate numbers, north as far as Horn (BOH, manuscript in K.V. Ak.). Gtl, found by LOH, only in the extreme south, but at three different localities: Sundre, Hallbjers, August 10, 1927, 1 specimen! Vamlingbo, Kettelviken, June 17, 1934, 2 specimens! Näs-Alvar† August 10, 1927, 1 specimen!

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark only two definite localities in Sjaëlland; the records from Bornholm (RYE 1906, p. 6; HSN and LRS 1941, p. 240) are uncertain because not supported by voucher specimens (West 1940, p. 51, and in litt.). Neither found in the eastern Baltic region nor on the British Isles.

*Total area*: Euro-Mediterranean species. In Europe south as far as northern Spain (FUE 1921, p. 218), central Italy (LUI 1929, p. 145), Bulgaria (montane; APF 1904, p. 341). East as far as Slovakia (ROU 1930, p. 196) and

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



southern Russia (JAC 1905–1908, p. 404). Northern Africa (JEA 1941–1942, p. 1048).

### Ecology

The mode of life of this species accords with that of *angularis*, together with which it regularly lives on the grass-rich parts of the Alvar† of Öland. Whether this species requires limestone remains undecided. In Central Europe it is a heath species (HOR 1941, p. 344), but especially at forest fringes at sun-exposed, sandy places (S.E.Z. 1852, p. 131; RTT 1870, p. 7; Dahl 1928, p. 196; Rapp 1933, p. 150).

### Biology

Distribution of the very few Swedish catches: III: 1; IV: 1; V: 4; VI: 5; VII: 4; VIII: 3; IX: 1. From the likewise scant Danish material, collected mainly in May and June, LRS (1939, pp. 349, 432) has concluded that this species deviates  
399 from the other three species of *Cymindis* in breeding in spring and hibernating as an adult. However, I found two quite immature beetles during the latter half of June (Öld Greby, 1921), and there is a report from Central Europe that copulation was observed at the beginning of July (BLK 1925, p. 35). It is possible that *humeralis*, like the ecologically closely related *angularis*, is an autumn breeder and hibernates in the larval stage (together with old adults).

### Dynamics

To date I have only seen brachypterous individuals, in which the wing rudiment is very narrow and about one-third the length of an elytron.

### \**Cymindis macularis* Dej.

#### Distribution

*Sweden*: Partly in the coastal regions of the south, and partly north on the Gulf of Bothnia and the adjacent inland. I. On the western coast only near Hill Halmstad, 1943 (FGQ) and Vgl Askim, Hovås (several collectors!). In Skå six localities, two of which are in the inland: Södra-Sandby (coll. MLF, MG! THS, MB! September 1853, ML!); Ilstorp, 4 specimens (THS, ML!). Ble, certainly Karlskrona region (ANK, VA!). Öld Stora-Rör, numerous (several collectors!); Högby, June 1932, 1 specimen (NOT!). Gtl Fårön (several collectors! MJB 1905, p. 83). Ögl (ZTT 1840, p. 46; HGC, 5 specimens, coll. JNS!

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

1 specimen, coll. WLN, LG!). Upl Sandhamn, August 3, 1937, 1 specimen (LTH). II. Delimiting localities of the northern area, which are directly continuous with the Finnish area: Ång Råskärsön in Örnsköldsviks Skärgård, July 8, 1936, 1 specimen (LTH); Vb Bygdeå, July 17, 1925, 1 specimen (FHL!); Lyl Lycksele, June 24, 1832, 2 specimens (ZTT 1840, p. 46); Nbt Boden, August 15, 1918, 11 specimens (SLL, RM!); Över-Kalix, two localities, July 26, 1938, 3 specimens (LTH).

*Norway:* Only a few localities in the south, some of which are isolated, so that the continuity of the area seems uncertain. 1 Hvaler, Prestesanden, June 1914 (MO!). 15 Kongsberg, April 1882, September 1883 (MO!). 5 Mandal, August 18, 1923; Lister, Kviljo, October 1922 (MO!). 6 Jæren (HLS 1915, p. 34). Very rare throughout; except for the records from Jæren, all reports by MST (N.E.T. 1933, p. 256).

400 *Finland:* In the southern half very widely and probably continuously distributed; possibly missing in the southern coastal region between Helsinki and Ik province. Not established on Åland per se; on the other hand, found on Al Kökar (HLL); also on Hogland in the Gulf of Finland (SRS, MH!). Along the entire Bothnian coast north as far as Ob Simo (KRG). In the inland north of latitude 64° N there are only three localities: Ok Säräisniemi (WUO, coll. LBG!); Lk Sodankylä (LBG!); Muonio (SBJ 1873, p. 93).

*Russian sector:* Lm Kantalaks (SBJ 1873, p. 94). In southern Karelia there are five localities: Kr Konchosero (SBJ, MH!); Kn Karhumäki 1943 (KRV); Ko Petrosavodsk (SBJ 1873, p. 95); Sv Uslanka, 1943 (PFF); Gumbaritsa, 1942 (PME!).

*Adjacent regions:* In Denmark rare but rather widely distributed, especially in northern Jylland, also on Bornholm (West 1940, p. 51). Estonia, in the southeast (SDL 1872), one locality on the northern coast (HAB in litt.). Latvia (ULN 1884; LCK and MIK 1939). Leningrad region (OBT 1876; BSK 1925); also near Lempaala 1943 (PHJ). Not found on the British Isles.

*Total area:* Palearctic species. In Europe predominantly northeastern, west as far as Holland and Belgium (EVS 1898, p. 106; 1922, p. 41); doubtful in France (DEV 1935, p. 60). South as far as Bavaria and Austria (HOR 1941, p. 347), Poland (LMN 1913, p. 60). In the northeast as far as Mezen (PPP 1908, p. 6). Turkmenia (according to CKI 1927–1933, p. 1476). Western Siberia (HEY 1880–1881, p. 21).

### Ecology

Exclusive inhabitant of sand and, compared with *angularis* and *humeralis*, requires much drier and looser soil in which it can tunnel itself to some extent down. The vegetation must not form a closed cover and consists of dune grasses (viz. *Psamma*), *Calluna* (also see N.E.T. 1923, p. 256; S.H.A. 1939, p. 34), *Arctostaphylus uva-ursi*, etc. In Sweden quite predominantly at the

sea, in Finland also inland. In Central Europe likewise often on dune sand (B.E.Z. 1872, p. 155), but also in dry pine heaths (S.E.Z. 1852, p. 131; 1871, p. 412; D.E.Z. 1907, p. 156).

### Biology

Scandinavian catches: IV: 1; V: 1; VI: 6; VII: 9; VIII: 11; IX: 5; X: 2. In Denmark a still more pronounced mid- and late summer species (LRS 1939, p. 349). Immature beetles were found in northern Sweden on July 8 (Ång) and July 16 (Nbt), in Central Europe purportedly already in April (BUR 401 1939, p. 199). It is undoubtedly an autumn breeder (as assumed by LRS l.c., p. 432), which hibernates exclusively in the larval stage.

### Dynamics

Wing dimorphism evident. In brachypterous specimens the wing rudiment is very narrow and about one-fourth the length of an elytron. The macropterous form, which I have seen to date only from Finland, has fully developed wings and is certainly capable of flight.

*\*Cymindis vaporariorum* L.  
(*basalis* Gyll.)

Distribution  
(map in DEV 1930a, p. 113)

*Sweden:* Found in almost all provinces but very unevenly distributed. In Skå very rare, south as far as Vombsjön, September 1942, 1 specimen (Dahl, ML!). Ble (leg.?, coll. GLL, SH!). Små Kalmar (STH, ML! HGL, coll. JNS!). A broad gap (actual?) occurs through Små and Hll. On Öld only three localities, missing on Gtl. The central Swedish area seems to be directly continuous with the southern Norrland area; from Upl and Gst there are, however, only old records of provinces. Across Ång, southern Lapland, and large parts of Jtl a distinct gap occurs, delimited by the following localities: Southward—Jtl Mullfjället, 1840 (ZTT, ML!); Vällistafjäl (RNG, E.T. 1915, p. 7); Hallen, Drommen, June 24, 1933 (FHL!); Mdp Liden (ADZ, LD). Northward—Lyl Sorsele, several localities (GTZ, E.T. 1932, p. 55; additionally, unpublished records!); Ruskele, 1943, 1 specimen (HEQ!); Vbt Degerfors, Åheden, 1938, Svartberget, 1940 (FRL!); Jörn, 1925 (LTH); Nbt Pitsund, 1936 (LTH). In the fjelds of Lapland widely distributed.

*Norway:* I. Southern Norway, widely distributed, especially in the fjelds, singly also in the coastal region. North as far as 26 Hitra (STM, according to SHY 1879, p. 16); 24 Dovre, Drivstua; 25 Røros. Absence in the Trondheim region remarkable. II. In the north from 30 Klovimoen in Vefsn and Dalen in



Hattfjelldal (STE, MO!) as far as 41 southern Varanger, Strand (SPS, according to STA) apparently continuously but rather unevenly distributed. North as far as 37 Hammerfest (SPS 1888–1889, p. 107; 1899, p. 148).

402 *Finland*: Found almost throughout the country, but irregularly distributed. There seem to be two notable gaps: first—on the western coast between St Björneborg (ARO, MH!) and Om Brahestad (WUO, MH!); second—in the inland between Sb Kuopio (ULV, MÅ!) and Lk Sodankylä (SUD, MH!). Not known from Åland; on the other hand, found on Ab Nagu (REU, MH!); also on Hogland (SRS, MH!).

*Russian sector*: Throughout the coasts of Kola Peninsula, east as far as Lj Ponoj (SBJ 1873, p. 94; PPP 1905, p. 98; MH!). In Karelia found to date only in the south, north as far as Kn Perguba (PPP 1899a, p. 12; MH!).

*Adjacent regions*: In Denmark rare, found mainly in Jylland; on the islands found only in northern Sjaëlland and on Bornholm (West 1940, p. 51). Estonia (HAB in litt.); Latvia (SDL 1891). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 371), also Ireland (JHS and HLB 1902, p. 591). Shetland (West 1930, p. 75).

*Total area*: Palearctic species. In Europe almost boreo-montane, south as far as the Pyrenees (FUE 1921, p. 221; DEV 1935, p. 60), central Italy (montane; LUI 1929, p. 143), Bulgaria (montane; APF 1904, p. 344). In the northeast as far as Kanin (PPP 1909, p. 9) and Pechora (SBJ 1898, p. 339). Siberia (HEY 1880–1881, p. 21; PPP 1907d, p. 24), east as far as Kamchatka (JAC 1905–1908, p. 406).

### Ecology

Like the other species of *Cymindis*, a xerophilous species. Its requirement for dryness of soil is somewhat less marked, however, and it willingly tolerates the moderate shade of sparse pines or forest fringes. On gravel (moraine), frequently with a good admixture of sand, less often on dry peat soil. Vegetation must be low and sparse, usually continuous only in patches, and consists of *Calluna*, *Empetrum*, *Arctostaphylus uva-ursi*, dry grasses, *Cladonia*, etc. In western Sweden on quite open *Calluna* soil; otherwise usually in pine heaths. Also lives regularly in the dwarf shrub heath of the lower *reg. alp.* (Pil, up to 1,100 m; SWB, coll. Palm) and in similar biotopes of the *reg. bet.* In the tundra of the Kola and Kanin peninsulas (PPP 1905, p. 98; 1909, p. 9). Successive species include, for example, *Miscodera*, *Amara quenseli*, *Trichocellus cognatus*, *Bembidion grapei*, and in the fjelds also *Amara alpina* (see LBA 1927, p. 20; 1933, p. 114). In Central Europe, especially in sandy pine heaths (S.E.Z. 1852, p. 131; D.E.Z. 1902, p. 262), in northern Germany chiefly in the region of large terminal moraines (Dahl 1928, p. 197).



## Biology

Distribution of the few dated southern Swedish catches: II: 1; III: 1; IV: 1; V: 4; VI: 10; VII: 5; VIII: 2; IX: 1. In Denmark a distinct maximum abundance occurs in July (LRS 1939, p. 349). An immature beetle was found in northern Sweden (Lul Hakkas, LTH), July 30, 1938. LRS (l.c., p. 432) is probably correct in assuming autumn breeding and larval hibernation. But a very large percentage of mature beetles also hibernate (also see S.E.Z. 1852, p. 131) which, for instance, in the Göteborg region were collected by older entomologists in large numbers in early spring (without more precise dates).

## Dynamics

Wing dimorphism evident. The narrow, truncated wing rudiment of the brachypterous form does not reach even half the length of an elytron. Macropterous individuals are fully winged and capable of flight. Flight observation: Lul Pålkem, July 14, 1942, in the evening, 1 specimen (WRN).

*Demetrias atricapillus* L.: "Apparently found by Fallén near Åsperöd [translated by LTH] (THS 1859, p. 222, according to GYL 1810, p. 188; no voucher specimen, probably = *monostigma*). Skå (VNS, E.T. 1904, p. 88; no voucher specimen), "Scania" (1 specimen ex coll. HTG, coll. JNS! Certainly wrongly labeled, see *Asaphidion caraboides*). Since the species is rather widely distributed in Denmark (West 1940, p. 48), its occurrence in Skå is in no way improbable, but has not been established to date. The old record from Norway (SIE 1875, p. 91) is erroneous.

\**Demetrias (Aëtrophorus) imperialis* Germ.

## Distribution

(map in LTH 1943b, p. 120)

*Sweden*: Exclusively at the eastern part of lake Mälaren in the Sdm and Upl provinces, a total of 13 localities. South as far as Sdm Mariefred, Bondkroken, July 23, 1942, several specimens (LTH); west as far as Sdm Sörfjärden, May 15, 1937, 1 specimen (Palm!); north as far as Upl Hjälstaviken, May 13, 1927, 3 specimens (LTH). Earlier found near Stockholm by SCH (GYL 1810, p. 188).

Absent in the rest of Fennoscandia.

*Adjacent regions*: Neither found in Denmark (erroneous record by BUR 1939, p. 192) nor in the Baltic States. Nearest localities in eastern Prussia (HOR 1941, p. 334). British Isles, only England (Joy 1932, p. 370).

404 *Total area*: Palearctic species. In Europe predominantly southern, rare in northern Germany (HOR l.c.). South as far as northern Spain (FUE 1921, p. 214), Corsica (DEV 1935, p. 59), southern Italy, Sardinia, Sicily (LUI 1929, p. 138), Serbia (APF 1904, p. 337). Transylvania (PTI 1912, p. 41). In Russia, north as far as Kharkov, east as far as Saratov (JAC 1905–1908, p. 399).

Northern Africa (BED 1895–1914, p. 269). The Caucasus (JAC l.c.; LSH 1936, p. 142). Kirgizia (JAC l.c.). Western Siberia (HEY 1880–1881, p. 17).

### Ecology

Occurs exclusively on the shores of stagnant eutrophic waters, on loam or gyttja (preferably quaking land).† Vegetation, always very rich and tall, consists primarily of *Phragmites*, for which the insect has a predilection, in addition to usually *Typha latifolia* and *Carex*; once found in a stand consisting almost solely of *Glyceria spectabilis*. The insect runs extremely fast along stems to hide in leaf sheaths. Successive species: primarily *Odacantha*, then *Agonum thoreyi*, at most of the Swedish localities, also *Oodes gracilis* (see detailed description of the biotope in LTH 1943b, p. 123). The mode of life of this species seems to be the same in Central Europe (see D.E.Z. 1907, p. 156; 1909, p. 639; LAU 1933, p. 198; HEB and MEX 1933, p. 119; GRD 1937, p. 32; JEA 1941–1942, p. 1037).

### Biology

Swedish catches: IV: 4; V: 12; VI: 6; VII: 10; VIII: 2; IX: 3; X: 2. Copulation has been observed on June 3 and June 15 (Sdm), and a quite immature beetle found on August 18 (Upl). The species is a spring breeder, hibernating as an adult, a fact observed several times in Central Europe (HEB and MEX, l.c.; HOR 1941, p. 334; also see LTH 1943b, p. 126). Observed consuming a *Collembola* (LTH l.c.; p. 124).

### Dynamics

Wings fully developed, with a reflexed apical part. They are comparatively small, slightly longer than the elytra; however, given the lightness of the narrow and flat body they apparently suffice for air-lifting the insect. Flight observation: Upl Kungsängen, June 20, 1941, at noon during full sunshine (FIE). My numerous attempts to induce flight, both by exposure to the sun and to warmth, proved futile.

405

\**Demetrias monostigma* Sam.  
(*unipunctatus* Germ.)

### Distribution

*Sweden*: In Skå seven localities, of which five are on the sea from Limhamn (ÅGR!) in the west as far as Åhus (WGR! NYH! JNS) in the northeast, often numerous; in the inland: Stehag, very frequent (several collectors! Already mentioned by THS 1859, p. 222); Börringe, 1880, 1937, several specimens

†(cf. pages 49 and 69; suppl. scient. edit.).

(MLC, VA! VNS, ML! NYH!). Ble Mjällby, Västra-Näs, on the sea, August 1, 1935, 2 specimens (LOH!). Outside this continuous area there are only two localities: Gtl (4 specimens, without locality data, WRN!), Gothen, on the river, at its exit from Linamyr, May 24, 1940, 6 specimens (LTH). Vrm Visnum, bank of Väner, May 1, May 16, 1943, 1 specimen each (WRN!).

*Norway:* Absent.

*Finland:* Discovered only recently in the vicinity of Helsinki: NI Munksnäs, *Phragmites* bank (muddy soil) on the sea together with *Agonum thoreyi* and *Paederus riparius* L. which occurred in large numbers, October 16, 1938, 2 specimens (PME, S.H.A. 1938, p. 264; 1939, p. 221!); Esbo, Finnträsk, 1944 (PME 1944, p. 212).

*Russian sector:* Absent.

*Adjacent regions:* In Denmark rather rare and local but found in Jylland as well as on the islands; not found to date on Bornholm (West 1940, p. 48) nor on Læsø (FDL 1935, p. 131). Neither known from the Baltic States nor the Leningrad region as far as I could ascertain. British Isles, only England (Joy 1932, p. 370).

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 60), central Italy and Sicily (LUI 1929, p. 138), Serbia (APF 1904, p. 338). The Caucasus (SDR and LDR 1878, p. 65). Kirgizia and western Turkestan (HEY 1880–1881, p. 17). Western Siberia (HEY l.c.).

### Ecology

This species exhibits the same peculiar “dual” ecological occurrence as *Dromius longiceps*. It thus lives partly on dune-sand seashores in fascicles of *Psamma* and *Elymus*, and partly in the inland on the swampy shores of stagnant water where the vegetation is dense and consists mainly of *Carex*, e.g., near Skå Stehag found many times in goodly numbers on peat-bog puddles. The two different biotopes of this species have been remarked in Central Europe for quite some years (LRS 1939, p. 431; West 1940, p. 48; NBG 1933, p. 59; GRD 1937, p. 32; FWL 1887, p. 139). There are many other reports of occurrence on dune beaches (SDT 1870, p. 407; S.E.Z. 1852, p. 151; LNZ 1857, p. 6; 1879, p. 2; E.B. 1912, p. 153; D.E.Z. 1915, p. 109; Dahl 1928, p. 188), as well as on inland bodies of water (S.E.Z. 1915, p. 214; ROU 1934, p. 77; Wolf 1937, p. 335; JEA 1941–1942, p. 1038). Larvae have been found, partly in large numbers, on dune grasses, and also one specimen on a stalk of *Phellandrium* (SLK, E.M. 1899, p. 54).

### Biology

Distribution of the dated Swedish specimens: IV: 17; V: 49; VI: 44; VII: 1; VIII: 4. In Denmark, where most of the specimens were found in April–May.



numerous larvae are known from August (LRS 1939, p. 348). Undoubtedly a spring breeder, hibernating as an adult (LRS l.c., p. 431).

### Dynamics

In Central Europe the species exhibits wing dimorphism (W.E.Z. 1921, p. 141; D.E.Z. 1927, p. 151; HEB and MEX 1933, p. 119); macropterous beetles have been observed in flight (ROU 1934, p. 77). The numerous Swedish specimens examined by me were all brachypterous, with totally reduced, scale-like wings.

### *\*Diachila arctica* Gyll.

#### Distribution

*Sweden*: In the older collections there are numerous specimens labeled "Lapponia" or "Lapponia borealis" (SCH, BOH, WBG, SDV; RM! MG!) which certainly refer, at least in part, to localities in Sweden. Only one definite locality: Tol Abisko (biotope, see below), July 20, 1939, female (LTH).

Doubtful: ZTT (1828, p. 34) states: "inter Enontekis et Karesuando" [hence in the Finnish region]. Later (1840, p. 31) he wrote: "ad ... Enontekis et Karesuando," which is merely a rephrasing of the earlier record.

Erroneous: "Jemtl. 63°20'" (GLL 1896, p. 8; no voucher specimen).

*Norway*: Only in the extreme north: 37 Hammerfest, July 1895 (SPS 1899, p. 147), August 11, 1907 (MST); Repvåg. 38 Kistrand (SPS 1888–1889, p. 100); Lakselv in Porsanger (several collectors); Jotkajavre (MST, STA); Bojobâeske, July 1924 (MST, MO!). 40 Vadsö. 41 southern Varanger, eight localities (several collectors; among others, SPS 1894, p. 58)

*Finland*: Only in the extreme north, usually very rare. Lk Sodankylä (SUD, MH!); Muonio, among others, June 19–20, 1867, several specimens (several collectors; SBJ 1873, p. 70; MH!). Le Ounastunturi (RNK); "inter Enontekis et Karesuando" (ZTT 1828, p. 34). Li Ivalo, Kyrö, July 26, 1894, 1 specimen (SBJ, according to PPP 1905, p. 88; MH!); Kalkoaivi on the Patsjoki, August 15, 1897, 1 specimen (PPP l.c.; MH!); Utsjoki, August 1905, 1 specimen (KRG!); Petsikkotunturi, August 3, 1897, 1 specimen (PPP l.c.). Lp, on Patsjoki opposite Svanvik (CRP).

*Russian sector*: Only three localities on the Kola Peninsula (PPP 1905, p. 88): Lt Chipnavolok (EDG, MH!); Lm Lujaur, Vormjokk, June 1887 (KLM, MH! MÅ!); Lj Ponoj, August 23, 1870 (SBJ 1873, p. 70; MH!).

*Adjacent regions*: Absent.

*Total area*: Circumpolar species. In Europe, outside the region, found only on Kanin Peninsula (PPP 1909, p. 5) and in Pechora region (PPP 1907c, p. 307). Siberia, east as far as Amur (HEY 1880–1881, p. 5; PPP 1910a, p. 306) and Kamchatka (JAC 1905–1908, p. 267). North America (Leng 1920, p. 46).



## Ecology

The mode of life of the species is only incompletely known. All observations, however, indicate that it is predominantly a riparian species which lives "usually in very marshy places overgrown with moss, especially on quaking-land† like substratum formed by species of *Sphagnum* and *Hypnum* at lakesides and on moor-like meadow soil" [translated by LTH] (PPP 1905, p. 18; also see SBJ 1873, p. 70; SPS 1894, p. 58). In its mode of life it is rather close to *Elaphrus lapponicus*, and in other features also since it is "a fairly pronounced spring insect" (PPP l.c.). Near Tol Abisko the sole specimen was collected with *Dyschirius helléni* (see that species) in a biotope typical of the latter. Occurs from the upper parts of the coniferous forest region to the lower parts of the *reg. alp.*

## Biology

Distribution of the few dated Fennoscandian specimens: V: 4; VI: 8; VII: 5; VIII: 4. Since the beetle appears early (SPS 1894, p. 58) and seems to be most numerous in June, it might be assumed that it hibernates as an adult.

408

## Dynamics

Wings fully developed. Several specimens observed in flight near Lk Muonio, June 19–20, 1867 (SBJ 1873, p. 70).

## Fossil Record

Galicia, early glacial (LMN 1894, p. 24).

### \**Diachila polita* Fald.

## Distribution

*Russian sector*: Found only in the eastern part of Kola Peninsula, six localities, all on the coast in Lj province (PPP 1905, p. 88) between Svjätöjnoss (ENW, MH!) and Pjalitsa (SBJ, MH!).

Absent in the rest of Fennoscandia, and the adjacent regions.

*Total area*: Palearctic species. In Europe, outside the region, found only on Kanin Peninsula (PPP 1909, p. 5), on Kolgujev Island (SEM 1905, p. 117) and in the Pechora region (PPP 1907c, p. 307). In Siberia widely distributed (among others, SBJ 1880, p. 12), east as far as Lena (PPP 1906b, p. 24), Amur and Kamchatka (HEY 1880–1881, p. 5; 1893, p. 13). According to PPP (1910a, p. 306) also in Altai, which has been questioned by JAC (1905–1908, p. 267).

†(cf. page 49; suppl. scient. edit.).

## Ecology

Within the region found exclusively in the tundra, where the species lives at drier places under moss and stones (PPP 1905, p. 88). In Kanin and the Lena region, found under the lichen *Nephroma arcticum* (PPP 1909, p. 5; 1906b, p. 24). In northeastern Russia and Siberia also occurs in the northernmost parts of the forest region (PPP 1906b; 1910a, p. 306).

## Biology

Records from the Kola Peninsula were made in July and August (PPP 1905, p. 88). Beyond this, nothing is known about the periods of development.

## Dynamics

This insect is flightless, wings reduced to small, narrow rudiments (both in Fennoscandian and Siberian specimens).

409

*\*Dichirotrichus pubescens* Payk.  
(*gustavi* Crotch.)

## Distribution

*Sweden*: Exclusively a seashore species. Found on the entire west coast between Skå Trälleborg, 1861 (MLF, MG!) and Boh Strömstad 1923 (LBH!). On the Baltic Sea partly in two separated localities on the mainland: Små Kalmar (several collectors!); Ögl Bråviken, June 1880, 3 specimens (MLC, HM!); partly in six localities on Öld and three localities on Gtl, the latter situated on the western coast: Öja (BOH 1849, p. 200); Hablingbo region, June 1898 (RMN, RM!); Klintehamn (JNS) in Varvsholmen, August 1923, numerous (LTH).

*Norway*: Probably continuously distributed along the entire seashore from the Swedish border to southern Varanger. On the southern coast, however, there are actually only two localities known to date: 4 Grimstad (HSS in litt.); 5 Kristiansand. On the western coast a gap occurs on either side of the Trondheim region; these gaps are certainly due to lack of investigation. Two northernmost localities: 37 Hammerfest (SPS 1899, p. 148); North Cape (SPS 1888–1889, p. 116).

*Finland*: Exclusively in Lp on the Polar Sea coast, but found in large numbers (several collectors! LBÅ 1933, p. 117).

*Russian sector*: Five localities on the coast of the western Kola Peninsula (PPP 1905, p. 97), east as far as Lm Sonostroff (SBJ, MH!). Also on the White Sea in Karelia: Kc Soroka (PPP 1899a, p. 18); Tschuja (SBJ, MH!); Solovetsk Island (coll. SAA!). The statement by LNG (1929, p. 53) that there are inland

records from Finland and Karelia is erroneous.

*Adjacent regions:* In Denmark rather widely distributed and often found in large numbers; in Jylland found on Fyn and Sjaælland (West 1940, p. 31 and in litt.). Absent in the Baltic States; LNG (1929, p. 52) has grossly misinterpreted RHL's work (1905, p. 13). British Isles (Joy 1932, p. 348), also Ireland (JHS and HLB 1902, p. 569). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 20).

*Total area:* Solely European species. Predominantly found on seashores, south as far as southwestern France (DEV 1935, p. 44). Also at the Mediterranean Sea south as far as central Italy and Sardinia (LUI 1929, p. 89). In the  
410 northeast as far as Kanin (PPP 1909, p. 7). In Germany (HOR 1941, p. 244) and Transylvania (PTI 1912, p. 28) also at inland saline places. Records from the Caucasus (SDR and LDR 1878, p. 76) and central Asia (RTT 1900, p. 123) are doubtful and should probably be referred to *ustulatus* Dej.

### Ecology

In our region an exclusively seashore species, which can without hesitation be termed a halobiont (LNG 1929, p. 51). In Central Europe it has also been found at inland saline places (see compilation by LNG, l.c.). It seems to require loamy soil covered with more or less continuous grassy vegetation, and remains under seaweed and larger stones close to the normal high-tide mark. On the Kola and Kanin peninsulas found in the tundra region (PPP 1905, p. 97; 1909, p. 7). The salt content of the soil ranges from 30‰ to 50‰ (LRN 1936, p. 133).

### Biology

Swedish catches: V: 2; VI: 8; VII: 15; VIII: 6; IX: 3. In Denmark where rich material is available, the maximum abundance in July is much more pronounced, and larvae have been found partly in March and May, and partly from September to November (LRS 1939, p. 342). It is doubtless an autumn breeder, hibernating in the larval stage (to a lesser extent, also as an adult) (LRN 1936, p. 133). The carabid is said to preferably attack species of *Bledius* (LRN l.c.). Since the closely related species *obsoletus* Dej. consumes "halophytes" (JNN 1905, p. 173), it is possible that *pubescens* also subsists on vegetable food.

### Dynamics

Wings fully developed. The beetle has been observed flying in the evening in Denmark and France [LRN 1936, p. 133; *Ann. Soc. Ent. France* (4) 9, 1869, p. lxiii].

## Variation

This species is highly variable in color. In the description of these forms, however, its sex-linked nature was usually overlooked (LTH 1942a, p. 170). None of the color aberrations exhibit a geographic limitation in our region.

411

\**Dichirotrichus rufithorax* C.R. Sahlb.

## Distribution

*Sweden*: Only in eastern Central Sweden, with six rather widely separated localities. Ögl Nörrköping, April 9, 1924, 1 specimen (WSJ. coll. LTH). Nke Örebro. Hagastrand, 1937, several specimens (JNS! NYH!). Sdm Toresund, not earlier than 1905 (SLL, RM, according to JNS). Stockholm (BOH, 1 specimen, RM! VYL, 1 specimen, MU!). Rackarebergen, 1901 (MJB, E.T. 1901, p. 191; numerous specimens in several collections!), Ladugårdsgårde, September 14, 1924, 3 specimens, March 1925, 4 specimens (LTH), Sveaplan, 1943 (LDN! LLR!). Upl Uppsala, not earlier than 1905 (LBL, 1 specimen, RM!), April 1906 (CDG!). Vst Sala, May 31, 1884 (leg.?, 1 specimen, MG!).

*Norway*: Absent.

*Finland*: In the south widely but rather sparsely distributed. In the coastal region between Helsinki (several collectors!) and Ka Viborg (PRT), a gap possibly occurs. Not known from Åland or the other islands. Northernmost localities: Oa Seinäjoki, 1936 (PHJ!); Tb Jyväskylä, 1943 (PHJ); Sb Kuopio (LEV, MH!), Puijo, 1919 (FSI, coll. KRG!); Kl Sordavala (LNN).

*Russian sector*: Strangely not found.

*Adjacent regions*: Absent in Denmark. In Estonia, three localities (HAB in litt.); Latvia, Kurland (SDL 1872, 1891; LCK in litt.). Leningrad region (OBT 1876). Absent on the British Isles.

*Total area*: Palearctic species. In Europe predominantly northeastern, west as far as northwestern Germany (HOR 1941, p. 245), south as far as Austria<sup>25</sup> (HOR l.c.), Slovakia (ROU 1930, p. 162), Moscow (JAC 1905–1908, p. 388). Western Siberia (SBJ 1880, p. 45; RM!).

## Ecology

In Sweden this species is entirely dependent on culture and has been found to date only in cities or their immediate vicinity on loamy fields and construction sites, where the vegetation consists of sparse, but in part tall grasses and weeds (e.g., *Artemisia vulgaris*). In Finland the species also seems to be synanthropic, but possibly not as exclusively so. Near Åbo it was found on soil overgrown

<sup>25</sup>Records from Toscana and Sicily (PTA 1923, p. 204; 1934, p. 92; LUI 1929, p. 89) are probably erroneous.



- 412 with *Artemisia vulgaris* (SBJ 1873, p. 132). However, there as well as in Central Europe, it has been recorded from sandy soil (LTZ 1885–1892, p. 27; Dahl 1928, p. 171) and in Germany occurs especially on river banks (LTZ l.c.; HOR 1941, p. 245) and is not as synanthropic.

### Biology

Distribution of the dated Swedish specimens: III: 4; IV: 20; V: 1; VI–VIII: 0; IX: 9. Reportedly a spring insect in Central Europe also (BUR 1939, p. 187). It might well be assumed that the species is a spring breeder, hibernating as an adult. The record of one specimen from a nest of *Talpa* (PLZ 1939, p. 5) is certainly an accidental find.

### Dynamics

Wings fully developed and certainly functional. However, no flight observations available. In Finland three specimens were found in sea drift (PME 1944, p. 38).

\**Dolichus halensis* Schall.  
(*flavicornis* Fbr.)

Distribution  
(map in BCH 1938, no. 65)

*Sweden*: Exclusively on the western coast of Skå: earlier found in various localities, sometimes in moderate numbers, but in the present century only a solitary record is available (2 specimens). Trälleborg (MLF, according to THS 1867a, p. 47); Håslöv, 1880–1888, numerous (PTT, numerous collectors!); Limhamn, 1868–1883, numerous (several collectors!); Barsebäcksby, in a cowshed, June 1940, 2 specimens (SJG, according to NYH, O.E. 1941, p. 11); Ven, several specimens (VNS, according to JNS); Ramlösa, a few specimens (THS 1859, p. 256); Farhult (WLG, 1 specimen, MM!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark rather rare, but widely distributed on the islands, and also one locality on Bornholm (West 1940, p. 42). According to ULN (1884, p. 11) one locality in eastern Latvia; otherwise missing in the Baltic States and the Leningrad region. On the other hand, found in northern Poland (OGI 1931, p. 32). Not found on the British Isles.

- Total area*: Palearctic species. In Europe predominantly eastern, toward the south distributed as far as the Pyrenees (FUE 1920, p. 195), central Italy (LUI 1929, p. 131), Greece (OTZ 1886, p. 212). The Caucasus (CHD 1846, p. 119; SDR and LDR 1878, p. 69). Western Turkestan (HEY 1880–1881, p. 27). Siberia (HEY l.c.), east as far as Amur (HEY 1893, p. 17) and Ussuri

(MDL 1931, p. 5). China and Japan (according to CKI 1927–1933, p. 813).

### Ecology

The few Swedish records only indicate that the species has been found in cultivated fields (once found even in a house). Also in Central Europe markedly favored by culture, living mainly in loamy fields (SDT 1870, p. 409; West 1940, p. 42; GRD 1937, p. 42). Its requirement for lime has not been established (WHF 1881, p. 20; Dahl 1928, p. 92). It is often found in large numbers under stacks of harvested corn, rape, and pea (B.E.Z. 1860, p. 320; CLS 1851, p. 122; MLL 1862, p. 89; WLK 1867, p. 8).

### Biology

Distribution of the few dated Swedish specimens: VI: 4; VII: 9; VIII: 24. In Denmark where rich material is available the maximum abundance in August is pronounced; no carabids found before June (LRS 1939, p. 328). Thus one is fully justified in asserting that this species is an autumn breeder and hibernates only in the larval stage (l.c., p. 390).

### Dynamics

The four Swedish specimens examined by me have fully developed wings that are certainly functional. Flight observations: Hungary (HST, E.N. 1876, p. 79); Podolia (PJT, E.A. 1929, p. 455). LTZ (1847–1852, p. 153) states: “wings usually developed”. It is therefore possible that the species exhibits wing dimorphism in the southern regions.

### *\*Dromius agilis* Fbr.<sup>26</sup>

#### Distribution

414 *Sweden*: Except for Hjd and Vbt, found in all provinces but certainly not universal in distribution. On Gtl there is only one old record without more precise locality data (BOH, RM!) and also on Fårön, July 23, 1926, 1 specimen (OLS!). On the other hand, the gaps in Vrm and in large parts of Gst and Hls might only be due to insufficient investigation. North from about latitude 63° N the species is very rare and has been found only in the in-

<sup>26</sup>The distribution of tree-dwelling species of *Dromius* is still not fully known, since they are caught in large numbers only during winter (under bark); in summer these insects remain almost out of reach in tree crowns. Therefore, the apparent absence of adults in summer might not be due to their dying out in spring as is generally assumed. This is evident, for example, from the frequent occurrence of *agilis*, *fenestratus*, and *quadrimaculatus* in the diet of crows in summer (NOT 1943). Evidently crows catch these insects from their resting places in tree tops.

land. Northernmost localities: Dlr Särna (AND, LF); Hamra (SJB); Hls Los (SJB); Gnarp, 1936 (ERL); Mdp Ånge, 1923 (Holm!); Ång Härnösand (ZTT 1840, p. 46); Kalvbäcken, Tjärn, 1939 (BRC, RM!); Jtl Revsund, repeatedly found (BGW); Jarm, 1932, 2 specimens (JNS and Palm, E.T. 1936, p. 184); Åsl Vilhelmina, July 1, 1943, 1 specimen (HEQ!); Lyl Ruskesele, August 3, 1943 (HEQ!); Sorsele Tjulträsk, July 15, 1921 (GTZ, E.T. 1932, p. 55); Lul Vuollerim, May 25, 1941 (RDB, ML!); Kvickjock, July 1843 (BOH, manuscript in K.V. Ak.); Saltoluokta July 13, 1928 (GTZ!); Nbt Pajala, 1938, 2 specimens (BUT, according to JNS).

*Norway:* In the entire western part of the country, between 5 Flekkefjord and 27 Trondheim (N.E.T. 1937, p. 147), only two localities in the region of 7 Bergen (SPS 1901, p. 32; N.E.T. 1930, p. 339). In general the species seems to be distributed without gaps from the Swedish border as far as about latitude 70° N, but except for the southern coastal region, very few localities are known. North of Trondheim region the following localities have been recorded: 31 Mosjöen (LYS); 32 Saltdal, Rognan (MST); 36 Målselv, two localities (SPS 1912, p. 167; also according to STA); 35 Tromsødal (SPS l.c.); 38 Jotkajok (STA); 40 Polmak in Tana (ESM, according to SPS l.c.).

*Finland:* Found in all provinces except Le. In the southern half widely and uninterruptedly distributed. North of latitude 65° N only the following localities: Ob Rovaniemi (KNG); Ks Paanajärvi (KRG!); Lk Muonio (SBJ, MH!); Li Enare, Kessnjarga (PPP 1905, p. 98; MH!); Lp Laukkujärvi, June 30, 1929 (STÅ); Suonikylä, July 25, 1929 (LNN, MÅ!).

*Russian sector:* Three localities in the southwestern part of Kola Peninsula (PPP 1905, p. 98), east as far as Lm Kusräka (SBJ, MH!). In Karelia found to date only near Kk Kouta (PPP l.c.; MH!) in the north, and Sv Karelka and Kuujärvi (PFF!) in the south.

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 48). Estonia (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 372), also Ireland (JHS and HLB 1902, p. 591).

*Total area:* Palearctic species. In Europe south as far as central Spain and the Balearic Islands (FUE 1921, p. 212), central Italy (LUI 1929, p. 138). Bulgaria (APF 1904, p. 336). In the northeast as far as Pechora (SBJ 1898, p. 339). Canary Islands (according to CKI 1927–1933, p. 1396). Siberia, Amur (HEY 1893, p. 29).

### Ecology

Found under bark and in moss on larger living trees (accidentally found in leaf litter at their base). On deciduous as well as coniferous trees. The former seem to be preferred in the southern part of the region (especially *Quercus*



and *Betula*, also *Fagus*, *Fraxinus*, *Tilia*, *Populus tremula*, and *Sorbus aucuparia*), but found everywhere on conifers, with spruce preferred somewhat more than pine. Outside the region also always on trees; in addition to those already mentioned, the following have been recorded: *Salix* (S.E.Z. 1842, p. 31; FRH 1897, p. 14), *Platanus* (FRH l.c.; Dahl 1928, p. 190), *Pyrus malus* (FWL 1887, p. 142), *Corylus* and "poplars" (Rapp 1933, p. 144).

### Biology

Southern Swedish catches: I: 6; II: 1; III: 15; IV: 30; V: 10; VI: 16; VII: 14; VIII: 12; IX: 2; X: 2; XI: 6; XII: 2. In Denmark maximum abundance already in March; a larva was found at the end of October (LRS 1939, p. 347), which might be an exception. Immature beetles, July 11, 1922 (Skå) and July 11, 1932 (Upl). Hibernation takes place in the adult stage even though the species is not as pronounced a "winter animal" as *fenestratus* and *marginellus* (SAA 1917, p. 290). Acarids (Rapp 1933, p. 144), Collembola and "small larvae" (Dahl 1928, p. 190), and aphids (BUR 1939, p. 192) have been mentioned as prey.

### Dynamics

Wings fully developed. One flight observation recorded in Germany (Rapp 1933, p. 144).

*\*Dromius angustus* Brull.

### Distribution

*Sweden*: Only three widely separated localities: Hll Särö, 1890–1923, numerous (several collectors!). Små Kalmar (HGL, coll. JNS! several specimens, WLN, LG!). Gtl Sandön, numerous (MJB, E.T. 1907, p. 105; 5 specimens, RM! JNS 1925, p. 71!).

416 *Norway*: Only on the southern coast, but apparently continuously distributed between 4 Kragerö (ULL 1899, p. 294; HLS 1910, p. 6) and 6 Jelsa in Ryfylke (HLS 1915, p. 33); total of eight localities. Sometimes found in large numbers. I examined one specimen from 5 Mandal (HLS, ML).

Absent in eastern Fennoscandia.

*Adjacent regions*: In Denmark only one locality on Bornholm (E.M. 1933, p. 363; West 1940, p. 49); remaining specimens reported as *angustus* proved to be *meridionalis* Dej. (E.M. 1938, p. 167). Absent in the eastern Baltic region. British Isles (Joy 1932, p. 372).

*Total area*: Solely European species. Predominantly western, east as far as eastern Germany (HOR 1941, p. 337), Poland (MAZ 1922, p. 5), Slovakia (ROU 1930, p. 193), Austria (HOR l.c.); south as far as southern France (mon-



tane: DEV 1935, p. 59) and northwestern Italy (LUI 1929, p. 139). According to CKI (1927–1933, p. 1398) also found on the Canary Islands.

### Ecology

In our region found exclusively on pines, in winter under bark at the base, and in summer beaten from branches (among others, HLS 1915, p. 33). On sandy soil (Gtl Sandön; 6 Jäären) or humus-mixed gravel (Hll Särö). In Central Europe not found exclusively on pines, although mentioned most of all, but also on spruce (LNZ 1857, p. 7; KLB 1927, p. 3), *Platanus* (FRH 1897, p. 14; JEA 1941–1942, p. 1065), *Sorbus aucuparia* (S.E.Z. 1921, p. 188), *Prunus cerasus* (Rapp 1933, p. 144). In Silesia sandy soil has been emphasized (LTZ 1885–1892, p. 44).

### Biology

The numerous occurrence of this species in winter near Hll Särö, as well as in Central Europe (e.g., S.E.Z. 1921, p. 188; LNZ l.c.; JEA l.c.) enables one to conclude that, like its relatives it too hibernates mainly as an adult. Oddly an immature beetle was found on January 29, 1923 near Hll Särö (LTH).

### Dynamics

Wings fully developed. Flight observations: 4 Kragero and 5 Kristiansand, 1 specimen each (ULL 1899, p. 294); Mecklenburg, August 4, 1933 (NBG in litt.).

417

### *\*Dromius fenestratus* Fbr.<sup>27</sup>

#### Distribution (map in BCH 1938, no. 68)

*Sweden:* In southern and central Sweden and the lower parts of Norrland continuously but rather unevenly distributed as far as about latitude 63° N. No records to date from southern Skå, Ble, in the coastal region between Små Kalmar and Ögl Norrköping, and on the coasts of Upl and Gst. But the species might actually be missing only in the first region (Skå) where the southernmost localities are: Lund region (several collectors!); Ringsjön, Klinta, 1922, 1 specimen (LTH). On Öld and Gtl only one locality each: Öld Stora-Rör (ERC, 2 specimens, MG!); Gtl Burs, September 6, 1927 (LOH, coll. JNS!); also on Gtl Sandön (MJB, 1 specimen, VA!). Northernmost or highest localities are: Vrm Arvika (RGS!); Dlr Ludvika (FRL! WSL!); Falun (several

<sup>27</sup>See footnote under *D. agilis*.

collectors!); Hls Bollnäs, 1940 (ALM); Forsa (old specimen, leg.?, RM!); Los (SJB); Jtl Revsund, 1940, 1941 (BGW!); Ång Sollefteå (ARN, according to JNS).

Doubtful: "Lapponia, rarius cum priori" [= *agilis*] (ZTT 1840, p. 47; see LTH 1938, p. 22).

*Norway*: Somewhat unevenly but certainly continuously distributed along the coast, from the Swedish border as far as Trondheim region north as far as 28 Steinkjer (N.E.T. 1923, p. 276; 1937, p. 147). Only in the east extends into the inland; northernmost records solitary: near 14 Valdres; 24 Sörem in Vågå; 12 Ringsaker.

*Finland*: Found exclusively in the southern half and continuously distributed south of latitude 62° N; somewhat abundant only in the southwest. Northernmost localities: Tb Keuru (PHJ); Oa Seinäjoki (PHJ); Om Pedersöre, Kyrkoby, on birch, October 1, 1934 (STÅ!); Ok Sotkamo, 1936, 3 specimens (PHJ!).

*Russian sector*: No records to date but can hardly be missing.

*Adjacent regions*: In Denmark rare, found only in Jylland (including Læsø) and on Bornholm (West 1940, p. 49). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area*: Solely European species. South as far as Portugal (FUE 1921, 418 p. 212), northern Italy (LUI 1929, p. 139), Serbia (APF 1904, p. 336). East as far as Transylvania (PTI 1912, p. 40) and Moscow (JAC 1905–1908, p. 400). Not boreoalpine, as claimed by BUR (1939, p. 193) (HOR 1941, p. 338).

### Ecology

Under the bark of various tree species. However, in our region the carabid seems to prefer pine (in Central Europe also most of the records are from *Pinus*), while spruce is frequented scarcely more than some deciduous trees; *Populus tremula*, *Acer platanoides*, *Fagus*, *Sorbus aucuparia*, *Alnus*, *Betula*, and *Tilia*. In Central Europe *Quercus* (PLZ 1937, p. 9), *Juglans* and "poplars" (Rapp 1933, p. 145) have also been mentioned.

### Biology

Swedish catches: I: 5; II: 1; III: 4; IV: 19; V: 6; VI: 5; VII: 2; VIII: 7; IX: 8; X: 7; XI: 6; XII: 1. The occurrence in Denmark is extremely odd; not a single specimen has been found before June, and hence LRS (1939, pp. 347, 428) has assumed autumn breeding and hibernation in the larval stage. On the other hand, in Sweden and Finland (SAA 1917, p. 293) the species behaves exactly like *agilis* and its other relatives and has even a greater decline in summer; thus in our region it undoubtedly hibernates as an adult and breeds in spring.

## Dynamics

Wings fully developed. Flight observations: Upl Djursholm, August 18, 1942 (LTH); Germany (Rapp 1933, p. 145).

*\*Dromius linearis* Ol.

## Distribution

*Sweden:* Quite predominantly a coastal species that is apparently continuous in distribution along the coasts of Hll, Skå, and southern Små, as well as on Öld and Gtl. Northernmost inland localities: Hll Åsa, 1935 (Palm) and Små Långemåla (about two miles from the coast), 1942 (Palm, coll. LTH). On Öld and Gtl it has concentrated on the west coast. Farther north on the eastern coast occurs only on islands in the outer ocean belt: Små Händelöp near 419 Västervik (NST, coll. SJB); Ögl Harstena in Gryt, August 14, 1932, 2 specimens (LOH, according to JNS); Sdm Utö, August 22, 1937, 1 specimen (NST, coll. LTH); Upl Sandhamn, repeatedly found (several collectors!); Runmarö (HFS, 3 specimens, LÖ!); Djurö, 1937, 2 specimens (LTH); Blidö-Skärgrård, Sundaskären, July 29, 1931, 1 specimen (NST, coll. LTH). Finally, there are some inland records, several of them in Skå, the farthest near Ringsjön, Klinta, 1922 (LTH; not found near Ringsjön by older collectors) and Hässleholm, July 26, 1943, 1 specimen (PLQ!). Ble Spjutsbygd, 1938, 2 specimens (SDH!). Små Långemåla (see above). One particularly isolated locality each on lakes Vätter and Väner: Ögl Motala Norra-Freberga, sandy bank, April 9, September 3, 1933 (Palm! LTH); Vgl Kinnekulle, Hällekis, July 19, 1872, 1 specimen (MRT 1873, p. 10; MG!).

Doubtful: Stockholm (BOH, according to GLL 1896, p. 7; 2 specimens, RM!). Probably from the Skärgrård of Stockholm.

*Norway ?* Only one old record. Oslo, Töien, 1 specimen (MOE, according to SHY 1879, p. 16). According to STA (in litt.) this report is questionable and in the Catalogus it has been question marked (?) (1939, p. 10).

*Finland:* Discovered late and found only in the extreme southwest. Al Jomala, Ytternäs (STK), and four islands in the Skärgrård southeast of Åland (HLL 1921b, p. 84; MH! LBG! STK). On the mainland only near N1 Esbo, November 4, 1938, 1 specimen (PME!).

*Russian sector:* Found only near Sv Mjatusova, September 6, 1869, 1 specimen (SBJ 1873, p. 96).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 48). Doubtful from Estonia (only the old record "in our region" by SDL 1891); in Latvia, two localities in the Gulf of Riga (LCK in litt.). Leningrad region (OBT 1876; BSK 1908b, 1929, p. 146). British Isles (Joy 1932, p. 372), also frequent in Ireland (JHS and HLB 1902, p. 591).

*Total area:* Western Palearctic species. In Europe south as far as southern



Spain (FUE 1921, p. 211), Corsica, southern Italy including Sardinia, Sicily (LUI 1929, p. 138), Greece, and Crete (OTZ 1886, p. 213). East as far as Ural (JAC 1905–1908, p. 399). Northern Africa (BED 1895–1914, p. 274). Syria (JEA 1941–1942, p. 1063). The Caucasus (CHD 1846, p. 59; SDR and LDR 1878, p. 65).

### Ecology

420 A markedly xerophilous and heat-requiring species. Within our region never found under bark but on dune seashores and in very large numbers. It lives (often together with *nigriventris*) in fascicles of *Psamma* and *Elymus* and also in completely dry and otherwise barren places. Secondly the species lives (especially in Skå, on Öld and Gtl) in dry meadows with sandy or gravelly soil and often thick vegetation of all types of xerophilous plants (*Rumex acetosella*, *Festuca* species, etc.), and at a considerable distance from the sea. In such places it can be swept, especially in the evening. The typical mode of life of the species in our region has been reported otherwise only from Denmark (LRS 1939, p. 431) and northern Germany (Dahl 1928, p. 189; GRD 1937, p. 50). Elsewhere the species has often been found on trees (under bark, on branches) and brushwood, under moss, etc. (see S.E.Z. 1842, p. 163; 1915, p. 214; MLL 1862, p. 87; Dahl l.c.; Rapp 1933, p. 144; HEB and MEX 1933, p. 120; JEA 1941–1942, p. 1063; FWL 1887, p. 142).

### Biology

Swedish catches: III: 4; IV: 6; V: 12; VI: 34; VII: 36; VIII: 40; IX: 9; X: 1; XI: 0; XII: 2. Numerous immature beetles observed from June 17 (Gtl) to August 15 (Skå), and one specimen found in the middle of May (Skå Ven, Palm!). LRS (1939, pp. 348, 430) concludes that this species normally breeds in spring and hibernates as an adult (larvae collected in July), and that perhaps autumn breeding and hibernation in the larval stage occurs as well, which is certainly correct. The larva is said to be a polyphagous carnivore (BLK 1925, p. 36).

### Dynamics

Wing dimorphism evident, but macropterous individuals, which are fully winged and certainly capable of flight, are rare (JEA 1941–1942, p. 1063, however, calls it “aile”). In brachypterous specimens the wings are stunted to minute oval rudiments. Nonetheless the species undoubtedly possesses a good capability of dispersal. In the last decades its population has increased phenomenally not only in Sweden (especially noticeable in Skå where it was a rarity at the time of THS 1859, p. 227), but also in northern Germany (HOR 1941, p. 336).



\**Dromius longiceps* Dej.

Distribution

*Sweden*: Extremely rare and sporadic in occurrence. At least the central Swedish localities might form a continuous area. Skå Skälderviken, seashore, 421 July 1913, several specimens (JNS, E.T. 1913, p. 383!), July 1913, 2 specimens, 1919 (VNS, RM! MG! VA!). Ble Ronneby, on the sea, June 27, 1936, 1 specimen (JNS); Karlskrona, Västra Mark, on the sea, July 15, 1939, 1 specimen, September 1, 1943, 1 specimen (SDH!). Hll Harplinge, July 1943, numerous (FGQ!). Ögl Tåkern, Källstad, April 11, 1930, 1 specimen (Palm!); Rystad, Luestad, April 9, 1928, 1 specimen (OSS, ML!). Nke Örebro, mouth of Svartå, September 4, 1938, 1 specimen (JNS); Sdm Julita, April 30, 1937, 2 specimens (BRD!). Vst Säterbo, shore of Sjölundas Hjälmars, April 25, 1943, 1 specimen (Rapp). Gst Storvik, shore of Storsjön, June 30, 1936, 1 specimen (LTH), April 26, 1937, 1 specimen (Palm).

*Norway*: Absent.

*Finland*: Found only in two widely separated localities on the western coast: Ab Åbo, 1863, several specimens, not found again (SBJ 1873, p. 95; MH! MÅ!). Ob Hailuoto (WUO, MH! MÅ! KRG 1932, pp. 101, 294!).

*Russian sector*: Absent.

*Adjacent regions*: In Denmark only two localities, respectively in Jylland and on Fyn (West 1940, p. 48). Estonia, Dorpat, 3 specimens (SDL 1872; HAB in litt.); Latvia, two localities (LCK and MIK 1939; LCK in litt.). Leningrad region (OBT 1876; BSK 1922, p. 55). British Isles, only England (Joy 1932, p. 371).

*Total area*: Euro-Caucasian species. In Europe south as far as southern France (DEV 1935, p. 59); northern Italy (LUI 1929, p. 138), Bosnia (APF 1904, p. 335), Transylvania (PTI 1912, p. 40). East as far as eastern Poland (MAZ 1922, p. 5) and Gorki (JAC 1905–1908, p. 399). The Caucasus (MÜL 1926, p. 257).

Ecology

This species shows the same peculiar “dual” ecological occurrence as *Demetrias monostigma*. It has been found in moderate numbers in Sweden (Skå, Hll) only in *Elymus* fascicles on quicksand at the sea and on Ob Hailuoto Island repeatedly found in exactly the same conditions. From Central Europe only a single, possibly corresponding record: “at the shore of the Baltic Sea” (S.E.Z. 1842, p. 31). All the other records, generally very numerous, from Central Europe (and Denmark) give the impression of a swamp species, living at densely overgrown lakesides and on shores of ponds together with *Odacantha* (B.E.Z. 1867, p. 412) or *Demetrias imperialis* (LAU 1933, p. 198); additionally often found hiding under bark of *Salix*, *Populus*, or in brushwood (numerous

records). All the remaining Swedish records (from Ble, Nke, Ögl, Sdm, Vst, Gst) correspond to those from Central Europe; the insect lives (always singly) on *Phragmites* at shores of lakes or calm rivers with an adjacent meadow-shrub zone. Near Åbo several specimens were found under the bark of *Populus tremula* (SBJ 1873, p. 95).

### Biology

Distribution of the few Swedish specimens: IV: 5; V: 0; VI: 2; VII: 13; VIII: 0; IX: 2. Similarly, the few Danish specimens, with one exception (August), were caught in March–April (LRS 1939, p. 348). In Finland found near Åbo in early spring and late autumn (SBJ 1873, p. 95); in Central Europe the situation is apparently similar (Rapp 1933, p. 143; BUR 1939, p. 193). LRS (l.c., p. 431) might thus be correct in assuming that this species breeds in spring and hibernates as an adult.

### Dynamics

Wings fully developed. Flight observation: Gst Storvik, April 26, 1937, flew out from sieved material in a home (Palm).

*\*Dromius marginellus* Fbr.<sup>28</sup>  
(*schneideri* Crotch.)

### Distribution

*Sweden*: In southern and central Sweden continuously but sparsely and unevenly distributed. In Skå only three localities in the west, south as far as Lund (THS, 1 specimen, MB!). Not known from Ble. In Små only four localities, south as far as Kalmar (several collectors!). Öld Borgholm (WLN, ML!); Gst Visby, Snäckgärdet, 1 specimen (BOH 1849, p. 198; 1850, p. 70; RM!). In central Sweden occurs somewhat more frequently; northernmost localities: Vrm Arvika (RGS, E.T. 1913, p. 232!); Torsby, 1931 (SVS); Dlr Ludvika (FRL! WSL!); Säter (AND, LF); Falun (several collectors!); Gst Storvik (Palm). Farther north two, at least apparently, isolated localities: Jtl Revsund, 1941, 1942, several specimens (BGW!); Vbt Hällnäs, Bodarna, June 16, June 24, 1939, numerous in the tops of pine trees (HEQ!).

*Norway*: Only in the southeast, seven localities on the coast west as far as 5 Mandal, and two localities in the adjacent inland region: 15 Kongsberg; 10 Os in Søndre Odal (SIE 1875, p. 92).

*Finland*: Uninterruptedly distributed in southern and central Finland. Not known in Al; on the other hand, found on Ab Korpo (WEG, MH!) and on

<sup>28</sup>See footnote under *D. agilis*.

Hogland in the Gulf of Finland (SAA 1917, p. 292). Northernmost localities: Om Haapavesi (HEL, NL); Ok Sotkamo (PHJ); Ob Liminka (SAA 1917, p. 293); Uleåborg (WUO 1910, p. 64; MH!).

423 *Russian sector*: Found only near Sv Vaaseni, 1942 (KRV!).

*Adjacent regions*: In Denmark very rare, found only on Sjaælland and Bornholm (West 1940, p. 49). Estonia (HAB in litt.), and in Wormsö (LBÅ 1924b); Latvia (SDL 1872). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area*: Solely European species. Markedly eastern, west as far as Elsass-Lothringen (DEV 1935, p. 58). South as far as northern Italy (LUI 1929, p. 139), Hungary (KTY 1900, p. 40), southern Russia (JAC 1905–1908, p. 400). East as far as Ural (HEY 1880–1881, p. 17).

### Ecology

Lives in our region exclusively on trees, and regularly on the conifers, especially pine, less often on fir or larch (SAA 1917, p. 292). In Norway purportedly on *Populus* and *Alnus* (SIE 1875, p. 92), and also in Finland on deciduous trees (SBJ 1873, p. 95; but see SAA l.c.). Near Vbt Hällnäs it was observed that in June the species lives in large numbers in crowns of pine. In Central Europe similarly found by and large on pines and secondarily on other conifers; the following deciduous trees have also been mentioned: *Acer* (West 1940, p. 49), *Betula* and *Salix* (LTZ 1885–1892, p. 44; RTT 1870, p. 5), *Quercus* (according to SAA 1923, p. 637), *Platanus* (FRH 1897, p. 14; SRN 1926, p. 31), and fruit trees (Rapp 1933, p. 145).

### Biology

Swedish and Finnish (SAA 1917, p. 292) catches: I: 7; II: 2; III: 5; IV: 17; V: 8; VI: 9; VII: 5; VIII: 5; IX: 3; X: 4; XI: 8; XII: 2. The species hibernates as an adult and probably breeds in spring (LRS 1939, p. 428).

### Dynamics

Wings fully developed and certainly functional. Corroborative flight observations absent, however.

*\*Dromius melanocephalus* Dej.

### Distribution

*Sweden*: Exclusively in western and southern Skå. On the coast between Kämpinge (several collectors!) and Hålsingborg, Råå (1933, 1934, LGN! 1938, 424 HZE!) continuously distributed and often numerous. Two adjacent inland



records: Skabersjö, Duveholm, May 1900 (PTT, 1 specimen, RM!); Södra-Sandby, Skatteberga, August 10, 1936, 1 specimen (LTH). Isolated in the southeast: Sandhammaren, on the sea, May 2, 1937, 3 specimens (Palm!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark widely distributed; also in Jylland (north as far as Aalborg) as well as on the islands, including Bornholm, but not frequent (West 1940, p. 50, and in litt.). Not found throughout the eastern Baltic region. British Isles (Joy 1932, p. 372), also frequent in Ireland (JHS and HLB 1902, p. 592).

*Total area:* Western Palearctic species. In Europe predominantly western; for instance, very rare in Austria and absent in eastern Prussia (HOR 1941, p. 340). South as far as southern Spain (FUE 1921, p. 214), southern Italy, Sardinia, Sicily (LUI 1929, p. 139), Greece (OTZ 1886, p. 213). Northern Africa (BED 1895–1914, p. 278). Near East (JAC 1905–1908, p. 400). The Caucasus (JEA 1941–1942, p. 1073, “var. *uniformis* Rtt.”).

### Ecology

Like *linearis*, found predominantly on *Elymus* and *Psamma* on sandy (rarely loamy) seashores, often together with that species. Additionally found, but always sparse, among leaf litter and grass on rather dry, more or less sandy soil in the inland (only two localities) or at least at some distance from the sea. From other parts of Europe, as far as I know, exist only two records of this species on the seashore: Germany (Dahl, 1928, p. 192), England (E.M.M. 1925, p. 140). Generally (in Denmark also; West 1940, p. 50) the species lives in inland localities under moss, leaf litter, grass remains, etc., even under bark (several records). It is rather peculiar that the species has been found in southern Germany in humid places, for instance, on banks together with *sigma* (LAU 1933, p. 198; Wolf 1936, p. 263; HOR 1941, p. 340).

### Biology

Swedish catches: III: 2; IV: 3; V: 8; VI: 3; VII: 0; VIII: 4; IX: 3; X: 1; XI: 1; XII: 2. In Denmark two larvae were found in July (LRS 1939, p. 348). Spring breeder, hibernating as an adult (l.c., p. 430); in Central Europe, however, the pupa has been observed in April (BUR 1939, p. 193).

### Dynamics

In our region, and generally also in Europe, this species is constantly macropterous (according to JEA, the brachypterous var. *uniformis* Reitt. occurs in the  
425 Caucasus, see above). The beetle is certainly capable of flight, but observations are lacking to date in this regard.



\**Dromius nigriventris* Thoms.  
(*notatus* Steph., var. *nigriv*)

Distribution

*Sweden*: Over southern and central Sweden widely and certainly uninterruptedly distributed. Frequent especially on the coasts; the gap on the coast of Sdm is certainly only apparent. The oblique position of the northern boundary is unique and comprises the following localities: Dsl Tisselskog Dalen, June 15, 1938 (LOH, according to JNS); Vrm Lundsberg, April 1940, 1 specimen (WRN!); Vst Ängelsberg, July 4, 1937 (KLF!); Dlr Stora Kopparberg, two localities, 1943, 1 specimen each (KLF!); Gst Grönsinka, April 1943 (Palm); Gysinge, April 22, 1935, 1 specimen (Palm!); Upl Öregrund, July 9, 1937, 1 specimen (SJB!); Gst Utvalnäs (about 15 km NE of Gävle), on the sea, August 22, 1943, 1 specimen (NST, coll. LTH).

*Norway*: Only in the southern coastal region. Frequent especially in the southeast and widely distributed, north as far as 15 Kongsberg; 2 Hokksund and Oslo region, 1 Lillestrømmen. West as far as 5 Farsund (MST). The short subsequent gap is certainly only apparent. Then in Province 6, Jäeren and Ryfylke, five localities (HLS 1915, p. 34).

*Finland*: Only at the coast in the extreme southwest, partly on Åland and the islands situated eastward (several collectors!), partly on the mainland, with numerous localities between Ab Nådendal (AIL, MÅ! LEI 1938) and NI Hangö (STN!); Tvärminne (KRG).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 50). In Estonia only two localities on Ösel (MIK 1905; SUM 1931). Not known from Latvia and Leningrad region as far as I am aware. British Isles (Joy 1932, p. 373), also frequent in Ireland (JHS and HLB 1902, p. 592).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1921, p. 213), Corsica (JEA 1941–1942, p. 1074), central Italy and Sicily (LUI 1929, p. 139), and European part of Turkey (APF 1904, p. 337). East as far as Volga (JAC 1905–1908, p. 400). Asia Minor (APF l.c.). The Caucasus (CHD 1846, p. 59; JAC l.c.; ECH 1930a, p. 149). Western Turkestan (JAC, l.c.). Central Asia (according to ROU, C.C. 1928, p. 159). Concerning the report from northern Africa (HOR 1941, p. 340) I could find no voucher specimen.

The mode of life of this species shows the greatest similarity with *linearis*. The two species are numerous in fascicles of *Psamma* and *Elymus* on sandy seashores. Additionally, *nigriventris*, more so than *linearis*, also occurs inland

where it is less xerophilous. Here it lives (almost always singly) at more or less dry and indeed sun-exposed places (meadows, edges of fields, forest fringes, thickets, etc.) under grass remains, dry leaf litter, and such. Principally on sandy and gravelly soil, even on dry, hard loam. It has been repeatedly observed (Ögl, Gst) that this species has a predilection for living in the immediate vicinity of mounds of *Formica rufa*; this is probably an expression of the insect's marked heat requirement. In Central Europe the species has been found rather regularly under the bark of deciduous and coniferous trees (LTZ 1885–1892, p. 44; ROU 1934, p. 84), which happens in our region only very sporadically (see SBJ 1873, p. 95); according to Dahl (1928, p. 192) such represent hibernation places. Otherwise the mode of life of this species in Central Europe seems to be the same as in our region, although the species has also been recorded now and then from more humid places (D.E.Z. 1890, p. 200; Dahl l.c.). On the other hand, Wolf (1936, p. 263) has emphasized that it lives in drier places than *sigma* (and also *melanocephalus*). Its occurrence on sandy seashores has been observed only in northern Germany (GRD 1937, p. 50) and England (FWL 1887, p. 143), and not even once in Denmark (West 1940, p. 50; however, also see LRS 1939, p. 429).

### Biology

Swedish catches: I: 1; II: 3; III: 8; IV: 25; V: 25; VI: 51; VII: 22; VIII: 20; IX: 21; X: 17; XI: 3; XII: 1. Immature beetles found on July 22 (Sdm) and July 23 (Boh). It is certainly predominantly a spring breeder (LRS 1939, p. 429), hibernating as an adult.

### Dynamics

The species exhibits wing dimorphism but to date I have only seen one macropterous specimen (certainly capable of flight) from Vst. In brachypterous specimens the wings are reduced to narrow rudiments, much shorter than half the length of an elytron. Perhaps also dimorphic in Central Europe, since it has been mentioned as "normally wingless" (MÜL, K.R. 1934, p. 50; JEA 1941–1942, p. 1074).

### *Dromius quadraticollis* Mor. (*cordicollis* Vorbr.)

#### Distribution

*Finland*: Only one specimen found on the small island of Tytärsaari in the Gulf of Finland, August 3, 1932 (HLL, N.E. 1933, p. 119; MH!).

Not found in the rest of Fennoscandia.

*Adjacent regions*: Not found in Denmark. Estonia, two localities in the

Dorpat region (HAB in litt.); not known from Latvia. Leningrad region (BSK 1922, 1925).

*Total area:* Palearctic species. In Europe mainly eastern, westward as far as Silesia and Poland (HOR 1941, p. 337), Rumania and Bulgaria (JEA 1941–1942, p. 1066). Quite isolated in the Pyrenees (JEA l.c.). Siberia (among others, SBJ 1880, p. 22; MKL 1881, p. 19), east as far as Amur (HEY 1880–1881, p. 17; JAC 1905–1908, p. 400).

### Ecology

The Finnish specimen was found on a pine trunk on a sand dune bank. Outside our region it lives under bark or (in summer) on the branches of trees, especially fir (C.C. 1926, p. 256; E.B. 1929, p. 53; PLZ 1937, p. 9), and in Silesia also on oak (E.B. 1936, p. 269). Otherwise the mode of life of this species is totally unknown.

### Biology

Since the species has been recorded in Germany partly in winter (E.B. 1936, p. 269) and partly in early spring (E.B. 1929, p. 53), one must assume that, like the other tree-dwelling species of *Dromius*, it hibernates as an adult.

### Dynamics

Wings fully developed. Flying specimens observed in eastern Prussia (E.B. 1929, p. 53).

### *\*Dromius quadrimaculatus* L.<sup>29</sup>

#### Distribution

*Sweden:* Continuously distributed over southern Sweden and most parts of central Sweden, but sparser in the southern Swedish highlands. Northernmost  
428 localities: Dsl Mellerud region (FBG!); Nke Örebro (JNS!); Vst Västerås (SLL, VA! WGR!); Dlr Folkärna, Utsund, May 8, 1940 (TJT, according to KLF); Upl Östervåla, April 2, 1907 (OTT!); Bennebol (RGS!). An isolated record in the north is rather surprising: Ång Docksta, June 5–7, 1939, 1 specimen (BRC, RM!).

*Norway:* Exclusively found along the coast, from the Swedish border as far as 6 Jelsa in Ryfylke (according to MST; according to HLS 1915, p. 33, there are two other localities in Ryfylke). There seem to be no gaps in distribution.

<sup>29</sup>See footnote under *D. agilis*.

Doubtful: 10 Grue in Solör (SIE 1875, p. 92; no voucher specimen; confusion with the dark *marginellus* is conceivable).

*Finland:* On Åland repeatedly found and at several places (several collectors! LBÅ 1924a, p. 32!). On the other hand, on the mainland found only in the Åbo region (many collectors!) and “not rare” (SBJ 1873, p. 95; Frey 1918a, p. 44).

*Russian sector:* Absent.

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 49). Estonia, partly in the south and partly on the northwestern coast (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 372), also Ireland (JHS and HLB 1902, p. 592).

*Total area:* Euro-Caucasian species. In Europe south as far as southern Spain (FUE 1921, p. 212), Corsica (DEV 1935, p. 59), southern Italy, Sardinia, Malta (LUI 1929, p. 139), northern Greece (APF 1904, p. 336). East as far as Slovakia (ROU 1930, p. 194), Crimea and Tula in Russia (JAC 1905–1908, p. 400). The Caucasus (JAC l.c.).

### Ecology

Always found on trees, under bark and in moss, in our region quite predominantly on oak, in the south frequently on *Fagus*; additionally, solitary records for *Populus* species, *Salix*, *Sorbus suecica*, *Betula*, *Fraxinus*, *Pyrus malus* and *communis*; quite sporadic on coniferous trees (Ögl Omberg, Palm). In Central Europe apparently regularly on pine and fir (ROG 1856, p. 10); according to MLL (1862, p. 87) even “more on conifers than on deciduous forest trees”; there are also records for *Aesculus* (HEB and MEX 1933, p. 120), *Prunus domestica*, *Acer*, and *Platanus* (Rapp 1933, p. 146).

### Biology

Swedish catches: I: 4; II: 3; III: 8; IV: 24; V: 5; VI: 13; VII: 10; VIII: 10; IX: 3; X: 6; XI: 2; XII: 4. In Denmark a sharp maximum abundance likewise  
429 occurs in early spring and larvae have been observed from the end of April to the end of August (LRS 1939, p. 347). Spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. Flight observations recorded in Germany (MLL 1862, p. 87; JNN 1905, p. 170). The species was also found in large numbers in “gas tanks” in Elberfeld (CRN 1884, p. 12; see p. 15 above).



\**Dromius quadrinotatus* Panz.<sup>30</sup>

Distribution

*Sweden*: A southern species, very unevenly distributed. Especially in the southwest (extending into the Göteborg region) and the Stockholm region more widely distributed. However, actual gaps in distribution may not exist; for instance, its discovery in Boh and on the eastern coast between Små Kalmar and Sdm Trosa (SJB) may be only a question of time. On Öld there are only three localities (besides "Öld", WBG, RM!): Stora-Rör (ERC, MG!); Böda, July 14, 1940 (NYH!); Kyrktorp, 1943 (ERL!) Gtl Vamlingbo and Alskog (BOH 1851, p. 198; 1 specimen, RM!); Fårön (MJB 1905, p. 82; 3 specimens, RM!); Sandön, repeatedly found (several collectors!). Northern delimiting localities: Dsl Ed (ÅGR, SVS!); Vgl Kinnekulle, 1912 (UYT 1913a, p. 20); Nke Örebro, found only once (JNS); Dlr (and Gst) Grönsinka (Palm); Upl Fiby, April 1937 (BRD!).

*Norway*: Sparse localities on the southern coast, where it probably occurs continuously, extending into the southern parts of the western country: 6 Ryfylke, three localities (HLS 1915, p. 33); 18 Tyssedal in Hardanger (MO!). One locality quite isolated—26 Hitra, Laksåvik, 1 specimen (N.E.T. 1923, p. 276; 1937, p. 147)—but it is not improbable that the species will be discovered in the poorly explored northern parts of the western country, especially in the outer Skärgård.

*Finland*: Only on the southwest coast. I. On four islands in the Skärgård east of Åland (several collectors!). Also near Ab Runsala (STN! THG). II. NI Helsinki, Mjölö, 1894 (PPP 1895, p. 14; SAA 1923, p. 637; MH! MÅ!).

*Russian sector*: Absent.

*Adjacent regions*: In Denmark widely distributed, especially on the islands  
430 (including Bornholm), but rather rare, in Jylland only two localities (West 1940, p. 49). Estonia, only one locality on Ösel (HAB 1936a, p. 11). In Latvia (Kurland) more widely distributed (MIK 1911; LCK and MIK 1939). Not known in the Leningrad region, as far as I am aware. British Isles (Joy 1932, p. 372), also Ireland (JHS and HLB 1902, p. 592).

*Total area*: Euro-Mediterranean species. In Europe south as far as Portugal (FUE 1921, p. 212), southern Italy including Sicily (LUI 1929, p. 139), Bosnia (APF 1904, p. 336). East as far as Kiev and Crimea (JAC 1905–1908, p. 400). Northern Africa (BED 1895–1914, p. 276). Asia Minor (according to HOR 1941, p. 338).

<sup>30</sup>See footnote under *D. agilis*.

## Ecology

Under the bark of trees, in summer on branches, in our region almost exclusively on pine; there are only two solitary records otherwise, on *Betula* (Små) and *Alnus glutinosa* (Ögl). During winter under the loose scales of bark at the base of larger trunks, frequently very numerous together with *Salpingus castaneus* Panz. In Central Europe the species favors pine to a lesser extent; also recorded on fir (WLK 1867, p. 5; E.M.D. 1914, p. 68) and numerous deciduous trees (SDT 1841, p. 98; West 1940, p. 49; FRH 1897, p. 14; Rapp 1933, p. 146).

## Biology

Swedish catches: I: 2; II: 2; III: 4; IV: 14; V: 2; VI: 5; VII: 9; VIII: 6; IX: 1; X: 2; XI: 4; XII: 1. In Denmark maximum abundance already in March (LRS 1939, p. 348). The record of a larva found in early spring in Central Europe (BLK 1925, p. 36) is doubtful (LRS l.c., p. 429). At any rate, in our region hibernation seems to take place exclusively in the adult stage. It has been noted that the larva apparently attacks larvae of *Pissodes* (BLK l.c.).

## Dynamics

Wings fully developed. Flight observations recorded in Germany (Rapp 1933, p. 146).

### *\*Dromius sigma* Rossi

#### Distribution

*Sweden:* There are two areas, one extending from Skå to southern Vbt, the other in Nbt. The intervening gap is insignificant but probably actual. I. In southern Sweden very local and usually rare; in southern Skå found only  
 431 inland, south as far as Lindved (FLM, 2 specimens, MG!). To date not found on Öld, Boh, and Dsl; it is a rarity of the first order in the very thoroughly explored Göteborg region, where it has been found only twice. It is also striking that there are numerous localities on the eastern half of lake Vänern, but none on the western half. In eastern central Sweden the species is widely distributed and often numerous. Northernmost localities of the "southern area": Vrm Likenäs, 1933 (Palm and LTH 1937, p. 120!); Dlr Sollerön, 1918 (TGR, 2 specimens, VA!); Hls Ljusdal (SJB); Färila, 1941, 2 specimens (LBL, RM!); Mdp Njurunda, 1936, 1 specimen (LTH); delta of Indalsälven, 1937, 2 specimens (BRC, RM!); Jtl Bispgården, October 31, 1936 (BRD!); Ragunda (FRI, SLL, 5 specimens, VA!); Ång Undrom, June 1939, 2 specimens (BRC, RM!); Forsmo, September 17, 1940, 1 specimen (BRD!); Vbt Umcă, April 28, 1943,

1 specimen (Palm!). II. The small area in Nbt is directly continuous with the Finnish area: Notviken. Barn in swamp meadow, May 26, 1938, 5 specimens (LTH); Bälänge, bank of Luleälv, on *Elymus*, August 7, 1940, 2 specimens (LTH); Södra-Sunderbyn, dry grassy soil, May 27, 1939, 1 specimen (LTH); Över-Kalix, June 11, 1930, 3 specimens (LTH and Palm 1934, p. 42!).

Doubtful: Lapland "Lapp. Torn., rarissime" (FRG, according to ZTT 1840, p. 47).

*Norway*: Found only in the extreme southeast on both sides of Oslo Fjord, with a total of six localities: 10 Kongsvinger (HSS, according to STA); 1 Lillestrømmen; 2 Asker; Ringerike (N.E.T. 1922, p. 119), also Juvärn (MST, MO!); 3 Fiskum (N.E.T., l.c.): Tofte in Hurum.

Erroneous: All older records (especially SIE 1875, p. 93) are erroneous, due to confusion with *nigriventris* (MST, N.E.T. 1922, p. 119).

*Finland*: South of latitude about 63° N, almost universal in distribution. The gap on the western coast between Ab Nystad (SDM, MH! HLL) and Om Jakobstad (STÅ) is certainly only apparent. On the coast north as far as Ob Simo (WUO, MH!). Farther north only two inland records: Ks Salla (ENW, MH!); Lk Muonio (SBJ 1873, p. 95; 1 specimen "Lapponia, coll. Sahlberg," MÅ!).

*Russian sector*: In northern Karelia near Kk Kouta (SBJ, MH!). In the south several localities (several collectors! PPP 1899a, p. 12), north as far as Kn Semsjärvi (CRP!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) but not abundant (West 1940, p. 50). Estonia (HAB in litt.); Latvia (SDL 1872), Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 373).

432 *Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1921, p. 214), central Italy (LUI 1929, p. 139), Albania (APF 1904, p. 337). In the northeast as far as Pechora (SBJ 1898, p. 339). Northern Africa (BED 1895–1914, p. 227). Asia Minor (according to HOR 1941, p. 339). The Caucasus (ECH 1930a, p. 149). Kirgizia (HEY 1880–1881, p. 17). Siberia (among others, SBJ 1880, p. 22; RM!) and in the east (HEY l.c.).

### Ecology

This species too exhibits the "dual" ecological occurrence characteristic of *Demetrias monostigma* and *Dromius longiceps* (and to a lesser extent also of *linearis*, *melanocephalus*, and *nigriventris*). It has, however, been found in fascicles of *Elymus* and *Psamma* on sandy, barren seashores, but to date regularly only in Skå and southern Hll. It generally lives on usually stagnant fresh water with shores richly overgrown with *Phragmites* and similar plants, especially at places where *Salix* shrubs or stands of *Alnus* border the inner edge of the *Phragmites* zone, under grass remains, dry leaf litter, etc., sometimes far away from the water mark. In the north often at the barns of swampy river-bank



meadows (see SBJ 1873, p. 95). Also in *Alnus* swamps, which more or less dry up in summer. It requires moderate to strong shade, but the requirement for humidity is not especially marked (in spite of the fact that it often lives in very wet places). It has been encountered under bark in our region only sporadically. In Central Europe chiefly in lowland forests and similar more or less swampy biotopes, often under *Salix*, as in our region (D.E.Z. 1907, p. 154; E.B. 1929, p. 158; HEB and MEX 1933, p. 121; JEA 1941–1942, p. 1073). Additionally, seems to live regularly under bark, for instance, of *Salix*, *Populus*, *Alnus*, *Platanus*, and even pine (ROG 1856, p. 10; FRH 1897, p. 14; Rapp 1933, p. 147). As far as I know, found on dune seashores only in northern Germany (S.E.Z. 1852, p. 132; GRD 1937, p. 65).

### Biology

Southern Swedish catches: III: 1; IV: 20; V: 22; VI: 29; VII: 7; VIII: 6; IX: 6; X: 6; XI: 4. Also in Denmark a pronounced spring animal (LRS 1939, p. 348). Immature beetles, August 7 (Nbt) and August 12 (Skå). Spring breeder, hibernating as an adult.

### Dynamics

- 433 The species exhibits wing dimorphism, but to date I have only seen one specimen (Vst) of the macropterous form (which is certainly also capable of flight). In the normal, brachypterous individuals the wings are stunted to narrow rudiments and do not attain even half the length of an elytron.

*\*Dyschirius aeneus* Dej., Wgn.

### Distribution

*Sweden*: Very rare and highly local, distributed mainly in central Sweden and on GtI; the connection southward is not clear. Skå Lund, since 1853 (several collectors!); Nordana on Segeå, 1941, 1942 (Palm!); Lomma, 1942 (Palm!); Trollenäs, Marieholm (Palm!); Ven 1934 (Palm 1935, p. 7!); Hälsingborg, Gåsebäck, May 1943, 2 specimens (PLQ!). Små Värnamo, on Lagan, June 3, 1936 (LTH). Öld Stora-Rör, 1928 (JNS!). GtI, six localities, but only 1 specimen in each case. Vgl Dagsnäs, Hornborgasjön, 1939 (JNS). Boh Koön, 1943 (SJB). Ögl Alvastra, bank of Vätter, 1932 (Palm!). Nke Rinkaby (JNS, E.N.T. 1924, p. 146); Frösvidal, 1935 (JNS! NYH!). Sdm Vrena, Hallbosjön, August 15, 1937 (BRD!). Upl (FHR, VA!), Adelsö, 1935, 5 specimens (SJB!); Öregrund, July 20, 1937, 1 specimen (SJB!). Vst Arboga, 1936 (LTH). Vrm Arvika, lakeside, June 30, 1933, numerous (LTH). Dlr Ludvika, 1 specimen (WSL!); Smedjebacken, June 27, 1942, 1 specimen (SDH!); Hedemora (RGS!), 1935, several specimens (JNS!).



*Norway:* Only three localities in the southeast: 2 Oslo, Aker; 3 Fiskum; Hegstadmyra, Brevik (all according to N.E.T. 1923, p. 248).

*Finland:* Found only in the Skärgård of Åland: Eckerö, Finbo, June 16, 1922, 1 specimen (LBÅ 1924a, p. 31; N.E. 1924, p. 125; MH!); Kökar, Idö, July 6, 1939 (STK, N.E. 1940, p. 33!). Older reports from other regions pertain to *ludersi* and *septentrionum*.

*Russian sector:* No records.

*Adjacent regions:* In Denmark rare, found to date only in southern Jylland and on Sjaælland (LRN 1936, p. 129; West 1940, p. 10). Estonia, found to date only near Pärnu, 1938, several specimens (Palm 1943!); earlier records from the Baltic region pertain only to *ludersi* or *septentrionum*. From the Leningrad region there are no undisputable records. British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB, 1902, p. 563); however, I do not know whether this material was examined bearing *ludersi* in mind.

*Total area:* Palearctic species (the records from North America, Leng 1920, p. 48, urgently require re-examination). Its distribution is not fully known  
434 due to confusion earlier with other species; mainly *ludersi*. In Europe south at least as far as southern France and Corsica (DEV 1935, p. 22), southern Italy, Sicily (LUI 1929, p. 55), Albania (MÜL 1922, p. 76), and the European part of Turkey (APF 1904, p. 72). Western and eastern Siberia (MDL 1931, p. 4; LTH 1943a, p. 4). All the remaining records (those from Spain, Portugal, Syria, the Caucasus, western Turkestan, China, and Japan) must be re-examined.

## Ecology

In our region occurs on fresh, stagnant as well as slow-flowing waters, often at very small ponds and puddles (also see MST, N.E.T. 1923, p. 248); at the sea there are solitary records, probably accidental. Always found on very loamy-muddy soil, frequently with an admixture of gyttja.† Usually on wet, more or less bald patches among otherwise rich shore vegetation. Typical example: Vrm Arvika, northern shore of Kyrkviken (inlet of lake Glafs fjorden), on the inner side of the broad *Phragmites* belt, and hence at some distance from water. The insects appear in large numbers during sunshine on the surface of bald loamy-muddy patches with solitary *Alisma plantago-aquatica*, *Equisetum hiemale*, and sterile species of *Carex* but no *Bledius*, June 30, 1933 (LTH). This species is not at all dependent on species of *Bledius*; I have only once (Små Värnamo, June 3, 1936) found one specimen together with *Bledius fuscipes* Rye. On the other hand, species of *Heterocerus* and *Trogophloeus* often occur in the record localities; SJB found *aeneus* at two localities in Upl together with numerous specimens of *H. fenestratus* Thbg. (*laevigatus* Panz.). In England purportedly

† (cf. page 69; suppl. scient. edit.).

found together with *Bledius praetermissus* Will. (E.M.M. 1933, p. 152), and in Denmark with *fracticornis* Payk. (HSN and LRS 1941, p. 53); in Central Europe otherwise only species of *Platystethus* and *Heterocerus* have been mentioned (DEV 1924, p. 24) as successive species (and probably as prey); also on the sea (GRD 1937, p. 40; E.M.M. l.c.). Among the successive species in Germany, *ludersi* is frequently mentioned (WGN, E.M.D. 1915, p. 306; E.B. 1929, p. 173; HOR 1935, p. 20; DTZ 1937, p. 57), which is rarely the case in our region since *aeneus* prefers more solid, purely loamy soil.

### Biology

The few Swedish catches are distributed as follows: V: 9; VI: 16; VII: 5; VIII: 1. In Denmark also found mainly in June (LRS 1939, p. 320). It is certainly a spring breeder hibernating as an adult, as assumed by LRS (l.c., p. 370).

435

### Dynamics

Wings fully developed and certainly functioning. Flight observations absent to date however.

### *\*Dyschirius angustatus* Ahr.

#### Distribution

*Sweden*: Found only in two widely separated regions. I. Skå Ven, May, June 1934, 19 specimens (Palm 1935, p. 7!); Landskrona, Glumslövsbackar, July 1, 1937, 3 specimens (BRD!). II. Vrm Höje, on the river Klarälv, June 7, 1933, 1 specimen (Palm and LTH 1937, p. 116!).

*Norway*: A few localities from the central south as far as latitude 70° N. Between latitude 63°30' N and 67° N a gap occurs which might be actual. I. 24 Sörem in Vågå (N.E.T. 1923, p. 250); Dovre, Talleråsbru (N.E.T. 1920, p. 60); 27 Stören and Melhus; 28 Hell in Stjördal (N.E.T. 1937, p. 144). II. 32 Saltdal, two localities (N.E.T. 1923, l.c.); 36 Målselv, two localities (N.E.T. 1932, p. 24); 38 Elvestrand in Alta; 39 Karasjok (N.E.T. 1923, p. 250).

*Finland*: Only three localities in the north. Ks Paanajärvi, since 1934 (several collectors! HLL 1935, p. 3; N.E. 1934, p. 120); Li Ivalo, 1939 (PFF); Lp Lutto, Kõngäs, 1939 (PFF, N.E. 1942, pp. 56, 65).

*Russian sector*: No records.

*Adjacent regions*: In Denmark rare, but rather better distributed in Jylland, and one locality each on Årø, Møen, and Sjælland (West 1940, p. 10). Estonia, only near Odenpäh, 1910, 2 specimens (LCK 1927); Latvia, three localities (MIK 1905; KRG 1925e; LCK and MIK 1939). Leningrad region (BSK 1929, p. 144). British Isles (Joy 1932, p. 332).

*Total area:* Solely European species. South as far as the Pyrenees (FUE 1919, p. 54), southern France (DEV 1935, p. 22), northern Italy (LUI 1929, p. 55), Bosnia (APF 1904, p. 71). East as far as Rumania (MÜL 1922, p. 96) and the Dnieper (JAC 1905–1908, p. 273).

### Ecology

On fairly dry, possibly always more or less loam-mixed almost or completely barren sand; usually on steep slopes at some distance from water. In Skå found at the sea; otherwise found throughout Fennoscandia on river banks (see PFF 436 1943, p. 93), in northern Finland also at lake Paanajärvi (KRG 1937, p. 295). In Denmark (LRN 1936, pp. 125, 129; West 1940, p. 11) as well as in England (E.M.M. 1913, p. 187) almost exclusively at the sea; in Germany at rivers and lakes, even in sand pits (B.E.Z. 1863, p. 232; 1872, p. 157; D.E.Z. 1924, p. 154; E.B. 1925, p. 191). This carabid is strictly dependent on species of *Bledius*, and in Fennoscandia it has been found to date together with the following species: *Bledius nanus* Er. and *atricapillus* Germ. (Skå Ven), *erraticus* Er., *bosnicus* Bernh. and *vilis* Mäkl. (Ks Paanajärvi), and *arcticus* J. Sahlb. (Lp Lutto). Outside the region it has also been found with *subterraneus* Er. (E.B. 1925, p. 191), *arenarius* Payk., *longulus* Er., *opacus* Block., *rastellus* Schiø. and *tricornis* Hbst. (LRN l.c.). In France association with *nanus* seems to be almost obligatory (DEV 1924, p. 23; BUE 1931, p. 2). The beetle has a high temperature preferendum (KRG 1937, p. 299).

### Biology

The 10 dated Fennoscandian catches were made from May to July, most of them in June. In Denmark copulation has been observed in April, and larvae were found in July–August, pupae at the end of July, and immature beetles in October–November (LRN 1936, pp. 125 ff.). Hence a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent to date however.

### *\*Dyschirius chaldeus* Er.

#### Distribution

*Sweden:* Very rare. Found only on the western coast, within two small separated regions. I. Ska Trälleborg, July 1861 (MLF, 1 specimen, MG!); Kämpinge, May 1886 (PTT, 1 specimen, coll. THS, MB!); Skanör, June 1861 (MLF, ac-



cording to THS 1867a, p. 14, 1 specimen, MG!); Lomma, July 1942, several specimens (Palm! NYH, O.E. 1943, p. 38!). II. Hll Åskloster (ERC, 1 specimen, MG!); Släp (SDN, 3 specimens, MG! coll. LTH), Särö (ERC, 1 specimen, MG!), Vallda-Sandö, May 29, 1935, 1 specimen (Palm, E.T. 1943, p. 75).

Erroneous: Old Stora-Rör (MJB, E.T. 1903, p. 108); Gtl Fårön (MJB 1905, p. 81); certainly mistaken, for instance, for *politus*.

Absent in the rest of Fennoscandia (HOR 1941, pp. 99–100, has erroneously interchanged Sweden and Norway).

437 *Adjacent regions:* In Denmark rare, found to date only in southwestern Jylland and in the Copenhagen region (West 1940, p. 10). Absent throughout the Baltic Sea region (east of Skå). Also not known from the British Isles.

*Total area:* Palearctic species. In Europe, especially on the western coast, south as far as southern France (DEV 1935, p. 22), also on the western Mediterranean Sea in southern France (LNG 1929, p. 36) and Sardinia (LUI 1929, p. 54), as well as on the Black Sea in Turkey, Bulgaria, Rumania (APF 1904, p. 70; LNG l.c.); in southern Russia also on the Caspian Sea (JAC 1905–1908, p. 273). On the German Baltic Sea coast, only one specimen near Travemünde (HOR 1941, p. 99). At inland saline places in Germany (HOR, l.c.), France (DEV 1924, p. 21; l.c.), Poland (TEN 1937, p. 336), Rumania (ROU, C.C. 1927, p. 113), and southern Russia (JAC l.c.). The Caucasus (LSH 1936, p. 139). Turkmenia, western and eastern Turkestan, Afghanistan (MÜL 1922, p. 69). The records from Siberia (HEY 1880–1881, p. 16; JAC l.c.) must be checked.

### Ecology

Halobiont (LNG 1929, p. 35; LRN 1936, p. 128). In our region occurs exclusively at the sea, on more or less barren loamy soil with high salinity, together with *Bledius furcatus* Ol. (Hll) and *tricornis* Hbst. (Skå; O.E. 1943, p. 38). In Central Europe also found at inland saline places (B.E.Z. 1861, p. 186; D.E.Z. 1926, p. 305; E.M.D. 1915, p. 241; 1920, p. 16; LNG, l.c.). In Denmark found together with *Bledius germanicus* Wgn. (*spectabilis* Joh.) and *diota* Schiøf. (LRN l.c.), and in France especially with the former species (DEV 1924, p. 23). The beetle tolerates flooding during high tide (LRN l.c.). Regular successive species in our region, as well as in Denmark (LRN l.c.), is *D. salinus*.

### Biology

In Sweden found from May to July, in Denmark also in September–October (LRS 1939, p. 319), where a pupa was observed on September 8 (West 1940, p. 10). Undoubtedly a spring breeder, hibernating as an adult.



## Dynamics

Wings fully developed and doubtless functioning. Flight observations absent to date, however.

438

\**Dyschirius globosus* Hbst.  
(*gibbus* Fbr., *maritimus* Boh.)

## Distribution

(maps in BCH 1938, no. 30; LTH 1939a, p. 241)

*Sweden*: Distribution throughout the country without gaps. Rare in the actual fjelds, otherwise frequent everywhere. Northernmost localities: Tol Abisko region, three localities (BRD 1934, p. 220; LTH); Karesuando and Siikavuopio 1930, 1935 (BRC, RM!).

*Norway*: Except for the northernmost peninsulas, continuously distributed throughout the country. Found northernmost near 37 Hammerfest (SPS 1899, p. 147; MST).

*Finland*: Universally distributed.

*Russian sector*: In the western part of Kola Peninsula and along the southern coast east as far as Lv Varsuga (PPP 1905, p. 87). In Karelia certainly found all over but to date not known from the central sector due to lack of investigation.

*Adjacent regions*: In Denmark all over and very frequent (West 1940, p. 11). Estonia, also on Ösel and Dagö (SUM 1931; HAB 1936a, and in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 331), also Ireland (JHS and HLB 1902, p. 564). Shetland (West 1930, p. 74).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 56), Corsica (DEV 1935, p. 23), central Italy, Sicily (LUI 1929, p. 56), Greece (APF 1904, p. 74). In the northeast as far as Pechora (PPP 1907c, p. 307). Northern Africa (BED 1895–1914, p. 51). The Caucasus (SDR and LDR 1878, p. 64; MÜL 1922, p. 111). Siberia (among others, SBJ 1880, p. 10; MDL 1931, p. 4), east as far as Amur (HEY 1893, p. 14) and Lena (PPP 1906b, p. 25).

## Ecology

This is one of the most eurytopic of all carabids and therefore contrasts sharply from all other species of the genus. It may be found together with any of its relatives, e.g., on shores of diverse types (i.e., fresh water as well as saline water), or shores with a coarser soil composition, where the other species of the genus are absent. Furthermore it inhabits several types of places far from water if the soil moisture is not too low, e.g., in between moss, leaf

litter, grass remains, etc., as well as in sparse forests, on meadows, peat bogs (also in Germany; Peus 1928, p. 576), and swamps (among others, RNK 1938, p. 65), exhibiting a special predilection for places where *Alnus glutinosa* is predominant, but even found singly in *Sphagnum*. This species is certainly not dependent on any species of *Bledius*, *Heterocerus*, or any other special prey. It is rare in the fields and in Scandinavia has only been found in Hjd (Hamrafjäll, July 27, 1938, 1 specimen, BRK) and Tol (Lulletjärro, July 16, 1939, 2 specimens, LTH) in the lowermost *reg. alp.* close to the timber line. Contrarily, it has been found on the Kola Peninsula (PPP 1905, p. 87), near Pechora and Yenisey in the tundra (PPP 1910a, p. 308), and also high up in the Alps (SZM 1907, p. 121). In the rest of Europe, as in our region, it is extremely eurytopic (see West 1940, p. 11; Rapp 1933, p. 33; GRD 1937, p. 40). Dahl (1928, p. 26) states: "The decisive factors appear to be the presence of humic acids, the presence of insolation, and a soft soil." The first contention does not hold true for our region, and the second barely so; the assumed absence on limy soil (l.c.) is likewise hardly applicable.

### Biology

Southern Swedish catches: III: 5; IV: 20; V: 74; VI: 142; VII: 61; VIII: 33; IX: 14; X: 7; XI: 5. In Denmark maximum abundance already in April (LRS 1939, p. 320). Larvae were found on Öld (WGR 1915, p. 81) and in Denmark (LRS l.c.) at the end of July. Immature beetles, July 17 (Små), July 28 (Boh), August 5 (Öld). Spring breeder, hibernating as an adult. As prey, *Trogophloeus despectus* Baudi (Denmark; LRN 1936, p. 130) and a staphylinid larva (Små Södra-Unnaryd, July 17, 1940, LTH) have been observed.

### Dynamics

All the specimens examined have wings that are reduced to a narrow rudiment which does not reach even half the length of an elytron. I do not believe that macropterous individuals occur, and the record from "gas tanks" from Elberfeld (CRN 1884, p. 10; see p. 15 above) is enigmatic. The occurrence of solitary specimens in Finnish sea-drift material (Frey 1937, p. 436; PME 1944, p. 37) is undoubtedly a consequence of the fact that the species is also at home in the outermost cliffs. Its markedly eurytopic character, in spite of the absence of flight, confers upon the species a comparatively good capability of dispersal.

### Fossil Record

France, postglacial (LSN 1925, p. 948).

\**Dyschirius helléni* J. Müll.  
(*norvegicus* Munst.)

Distribution

*Sweden*: Only in northern Lapland. Lul Pålkem, 1 specimen in small dwarf-shrub bog, 4 km southwest of the village, August 14, 1940 (LTH). Tol Abisko and Stordalen, numerous in *Sphagnum* bogs (SLL! BRD! KRG! LTH; see E.T. 1930, pp. 48, 160; BRD 1931, p. 9; 1934, p. 219).

*Norway*: I. 24 Sörem in Vågå, September 1897, 1 specimen (N.E.T. 1923, p. 250). II. 35 Tromsdal, June 1904, 2 specimens (l.c.); Tromsö (SPS, according to STA). 39 Karasjok, Gorzzejok, July 19, 1907, 1 specimen (l.c.).

*Finland*: Only three localities in the north. Ks Paanajärvi, July 9, 1936, 4 specimens (N.E. 1936, p. 124; KRG 1937, p. 300; 1939, p. 1215!). Lp Lutto, Kögäs, in Dwarf-shrub bog, *reg. silv.*, 1939, 16 specimens (PFF, N.E. 1942, pp. 61, 65). Li Lemmenjoki, June 25, 1917, 1 specimen (THG; N.E. 1935, p. 108; MH!).

Erroneous: Ik Vammeljoki (N.E. 1923, p. 121, = *septentrionum*!).

*Russian sector*: No records.

*Total area*: Palearctic species. Outside the region, known to date only from two specimens from Siberia: Dudinka (latitude 69°25' N; *loc. class.*) in the arctic Yenisey region (MÜL 1922, p. 78).

Ecology

A pronounced stenotopic species, which has to date been found in numbers only in open *Sphagnum* bogs of a particular type: *Sphagnum fuscum* hummocks (frequently with an admixture of *Dicranum elongatum*) with *Rubus chamaemorus*, *Betula nana*, *Vaccinium uliginosum*, *Eriophorum vaginatum*, and at drier places often *Empetrum* (BRD 1934, p. 219; PFF, N.E. 1942, p. 61; KRG; LTH). The carabid was extracted from leaf litter and other plant remains in the recesses between the hummocks by sieving. The solitary records on river banks in Norway (N.E.T. 1923, p. 250) were certainly only accidental. In our region occurs in the *reg. bet.* and the higher parts of the coniferous forest region; on the other hand, in Siberia found in the tundra. It is a "stenothermic-stenoionic coldrequiring species" with a very low temperature preferendum; pH 4.2 to 4.4 (KRG 1939, pp. 1223, 1226). The statement by BUR (1939, p. 69) that this species occurs together with *Bledius longulus* Er. is probably based on incorrect information from Ik (see above). *D. helléni* is totally disassociated from species of *Bledius*.

Biology

To date catches have been made in the months of June to September with



most in July. One immature specimen found July 21, 1933 (Tol Abisko, BRD!). Hibernation takes place, at least partly, in the adult stage, but the early date of emergence indicates that larvae too may hibernate; the development possibly spans a period of two years.

### Dynamics

The numerous Fennoscandian specimens examined have reduced wings, about two-thirds the length of an elytron and devoid of a reflexed apical part. The insect is therefore flightless. Furthermore, since it is markedly stenotopic, its capability of dispersal must be very poor indeed.

### *\*Dyschirius impunctipennis* Daws.

#### Distribution

*Sweden:* Distribution extremely split, and occurring only on the coast, with the exception of three probably accidental inland records. I. On the southern coast of Skå: Kåseberga and Sandhammaren, 1866, numerous (THS 1867a, p. 14; 1867b, p. 41; ML! HM! LU!), Sandhammaren, June 27, 1931, 1 specimen (Palm); Kämpinge, numerous (THS 1867a, p. 14), June 1863, July, August 1864 (MLF, MG!); Skanör (THS, several specimens, MB!). II. On the coast of Hll, between Eldsberga, June 5, 1935, 4 specimens (Palm!) and Släp (SDN, 1 specimen, MG!). III. Öld and Gtl. Öld Hornsjön, June 27, 1920, 1 specimen (JNS 1922, E.T. 1921, p. 176!); Böda, August 1940, 1 specimen (HNS, RM!). Gtl Fårön (several collectors!); Sandön, 1868, 1 specimen (EIS and STX 1868, p. 375; MU!), not found again. Inland localities: Vgl Hindås, August 1909 (leg. ?, 1 specimen, RM!). Dsl Mellerud region (1 specimen, FBG!). Ögl Kisa, bank of Ören, July 1934, 1 specimen (Palm!).

Erroneous: Vst (ANK, 1 specimen, VA! Certainly wrongly labeled, compare with *obscurus*). Lapland (KLS, according to THS 1859, p. 189; "Laponia", leg. ?, 1 specimen, MU! Also see LTH 1938, p. 22).

*Norway:* Exclusively in 6 Jæren, three localities, rather numerous (HLS 1915, p. 13!).

Erroneous: Finmark (GLL 1896, p. 5). Accordingly, the records from Arctic Sea coast (LNG 1929, p. 35; HOR 1941, p. 99).

442 *Finland:* Three separate areas. I. Isthmus of Karelia, numerous localities (several collectors!), on the Gulf of Finland, as well as Ladoga, west as far as Ik Kuolemajärvi, Muurila (KRG!). II. Al Eckerö, Degersand, August 1928, several specimens (KRG 1929, p. 71!). III. St. Björneborg (KRG!); Ytterö, numerous (KRG 1932, pp. 283–285! ELF, N.E. 1934, p. 63).

*Russian sector:* Found on the bank of Ladoga (PPP 1899a, p. 8; PME! PFF!). According to PPP (l.c.) also found at the Swir River but probably at its mouth.



*Adjacent regions:* In Denmark (including Bornholm) moderate in distribution but locally frequent; however, not known to date from Sjaëlland (West 1940, p. 10, and in litt.). Estonia, on Runö and near Audru (KRG 1925e), also two localities on the Russian border (HAB in litt.). Latvia, both on the coast and in Livonian Aa (MIK 1905; KRG 1925e; LCK and MIK 1929). Not known from the Leningrad region as far as I know. British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB 1902, p. 563).

*Total area:* Solely European species. Chiefly found on the western seashore, south as far as northern France (DEV 1935, p. 22), isolated in Spain (FUE 1918, p. 52; MÜL, 1922, p. 68). Occurs sporadically in the eastern inland: eastern Germany (HOR 1941, p. 99), Slovakia (ROU 1930, p. 112), Poland (MÜL, C.C. 1929, p. 94; TEN 1931, p. 330), Russia, Kiev (JAC 1905–1908, p. 273).

### Ecology

In our region a typical inhabitant of the seashore that has been found additionally and constantly only at Ladoga; the remaining inland records must be considered accidental. It is, however, quite erroneous to designate this species as a “halobiont” (LNG 1929, pp. 16, 34; see HOR 1941, p. 99); it is certainly not even “halophilous,” since the salinity of the soil appears inconsequential. Lives on and in moist, fine, barren sand, usually quicksand (KRG 1932, p. 100), always together with species of *Bledius*. In our region, as well as in the rest of Europe (LRN 1936, p. 128; N.E. 1925, pp. 116, 117; JHS and HLB 1902, p. 563), predominantly together with *Bledius arenarius* Payk., more seldom with *fuscipes* Rye (KRG 1925d, p. 10; 1929, p. 71); according to BUR (1939, p. 69) also occurs with other species of *Bledius*. Regular successive species: *D. obscurus*.

### Biology

Swedish catches have been made from June to August. In Denmark from  
 443 March to September, with most of the specimens caught in June (LRS 1939, p. 319); larvae apparently found in summer (LRN 1936, p. 128). Hibernation takes place certainly in the adult stage. Fragments of *Bledius arenarius* were found in the intestine of a specimen (KRG 1925d, p. 4).

### Dynamics

Wings fully developed and certainly functional. LRN (in litt.) purportedly saw an individual in flight in Jylland.

*\*Dyschirius intermedius* Putz.

Distribution

*Sweden:* Very rare and found only in the southwest. In Skå there are eight localities; northernmost: Hälsingborg and Ramlösa (THS 1859, p. 190); Ringsjön (several collectors! THS l.c.); Ostra-Broby, Nordanå, May 28, 1939, 1 specimen (NYH!). Ble Karlshamn, May 28, 1941, 1 specimen (SDH!). Hll Falkenberg, gravel pit, June 2, 1935, 1 specimen (Palm!); Åskloster (ERC, 4 specimens, MG!); Släp (SDN, 6 specimens, MG!). Vgl Limmared, on small river, May 28, 1936, 6 specimens (LTH).

*Norway and Finland:* Absent. The record from Finland (STN 1917, p. 116) is erroneous (N.E. 1924, p. 124; 1935, p. 89).

*Russian sector:* Sv Uslanka, 1 specimen, on the sandy bank of the Swir River, 1943 (PFF!).

*Adjacent regions:* In Denmark rare, but in Jylland widely distributed; additionally, only in northeastern Sjaëlland (West 1940, p. 10). The species is not known from the Baltic States, nor the Leningrad region, nor the British Isles.

*Total area:* Solely European species. South as far as southern France (DEV 1935, p. 23), central Italy (LUI 1929, p. 55), Albania (MÜL 1922, p. 78), Transylvania (PTI 1912, p. 13). East as far as Slovakia (ROU 1930, p. 112), eastern Poland (JAC 1905–1908, p. 274), Bessarabia (MÜL l.c.).

Ecology

Occurs on the shores of fresh waters (stagnant or slow-flowing) as well as at the sea. It inhabits moderately moist, loam-mixed fine sand, usually with sparse vegetation of *Glyceria*, species of *Carex*, and similar plants, especially at places where the banks are terraced and sometimes very steep (see, for instance, Palm 1935, pp. 7, 22). In Vgl, together with *politus*. In our region occurs together  
444 with *Bledius nanus* Er. (Skå), *fuscipes* Rye (Vgl), *filipes* Sharp (Sv); in Central Europe also with *sub-terraneus* Er. (E.B. 1925, p. 191), *cribricollis* Heer (HOR 1941, p. 104), and *crassicolis* Boisd. (JEA 1941–1942, p. 279). Its preference for loam has also been established in Central Europe, where the species frequently occurs in pits at brickworks (HOR l.c.)

Biology

Distribution of the few dated Swedish catches: IV: 1; V: 4; VI: 6; VII: 2; VIII: 1; IX: 1. Also in Denmark, with more rich material, most of the specimens were caught in June, and it might be correct to consider the species a spring breeder, hibernating as an adult (LRS 1939, pp. 320, 370).

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

\**Dyschirius lüdersi* Wgn.

(E.M.D. 1915, p. 304; *aeneus* auct. p.p.; *unicolor* auct. nec Motsch.; see LTH 1943a, pp. 1 ff.)

## Distribution

*Sweden*: Distribution highly split, which seems to be divided into four subareas. I. In Skå, except in the north, widely distributed, especially frequent on the western coast. Northernmost localities: Ven, 1934, 1 specimen (Palm!); Herrevadskloster, 1891 (VNS, ML!); Knäbäck, 1941 (Palm). II. On the western coast between Hll Åskloster (ERC, MG! WIB, ML!) and Göteborg (SDN, MG!). Additionally, Boh Koster 1923 (LBÅ, E.T. 1924, p. 191!); possibly also occurs in the intervening parts of Boh. III. Öld, widely distributed and locally frequent. Also in Små, opposite Kalmar city (WLN, LG!) and three localities in eastern Ble (SDH!). On Gtl found everywhere, often frequent, also on Sandön (E.T. 1924, p. 145; JNS 1925, p. 27). IV. In eastern central Sweden widely distributed. Delimiting localities: Ögl Norrköping, 1921 (FRL!); Linköping (SLL, RM!); Tåkern and Alvastra, repeatedly found (Palm!); Vgl Dagsnäs, Hornborgasjön, 1939 (JNS); Nke Örebro and Rinkaby (JNS!); Vst Västerås (several collectors!); Upl Uppsala, 2 specimens (WRN!); Öregrund, 1937, 1 specimen (SJB!). An actual continuity, especially between the first three subareas, is possible.

445 *Norway*: Found only in the southeast: 1 Halden; 2 Oslo region, several localities, abundant at places (!); 3 Horten; Fiskum, Hegstadmyra; 4 Grimstad (all according to N.E.T. 1923, p. 247).

*Finland*: In the southern half widely but irregularly distributed. Frequent especially on the coastal region of the southwest (including Åland). On the western coast north as far as Oa province (three localities, LBÅ!), and isolated near Ob Hailuoto (WUO, MH!). In the inland the northernmost localities are: Tb Jyväskylä (KRG); Sb Kuopio (WLL); Kb Juuka, Halivaara, 1942, 1 specimen (KRG!). Isolated in the north: Ks Kuusamo (MKL, MH!).

*Russian sector*: Kola Peninsula: Iv Kaschkarantsa (MH!) and Tschavanga (PPP 1905, p. 87, "*aeneus*"); Varsuga (LEV, MH!). In Karelia: Kr Suma and Kn Tolvoja (PPP 1899a, p. 8, "*aeneus*"; MH!); also on the Swir River (SBJ, MH!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 10). Estonia, also on Runö (KRG 1925e), Nuckö (LBÅ 1924b) and Dagö (HAB in litt.). Leningrad region (BSK 1929). British Isles (WGN, E.M.D. 1915).

*Total area:* Palearctic species. Distribution not completely known due to earlier confusion with *aeneus*. In Europe, however, the species extends southwards at least as far as central France (DEV 1935, p. 22), central Italy (LUI 1929, p. 55) and southern Russia (WGN, E.M.D. 1915). Siberia, Ob region (LTH 1943a); certainly more widely distributed.

### Ecology

On moist, usually hard loam or loam-mixed sand and peat, mostly in the immediate vicinity of water, but also at very small pools or puddles that often dry up in summer. Otherwise found at larger lakes and calm rivers, and in especially large numbers in marshes at the sea. Frequently more or less rich, but not too tall vegetation present, consisting of species of *Carex*, *Glyceria*, and other grasses, *Potentilla anserina*, and similar plants; the carabid usually lives on more or less bald patches however. Throughout the rest of Europe the species likewise show a definite predilection for marshy meadows at the sea (see E.M.M. 1933, p. 152) and has also been found in inland saline places (E.M.D. 1915, p. 306; D.E.Z. 1917, p. 117); there is, however, no question of "halophily". Exceptionally the species occurs together with species of *Bledius*, for instance, in Finland with *Bledius fracticornis* Payk. (KRG 1925d, p. 14),  
 446 in Estonia with *subterraneus* Er. (N.E. 1925, p. 116); in our region more regularly together with various species of *Trogophloeus* (e.g., Gtl, LTH) and with *Heterocerus fenestratus* Thbg. (Upl, SJB); in France also with other species of *Heterocerus* as well as species of *Platystethus* (DEV 1924, p. 24).

### Biology

Swedish catches: IV: 2; V: 23; VI: 43; VII: 19; VIII: 6; IX: 2. Immature beetle, August 7, 1936 (Skå). Certainly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed and functional. One spontaneous flying beetle observed on August 7, 1936 (Skå, Kungstorp, LTH). In Finland numerous specimens have been found in sea drift (Frey 1937, p. 436; STÅ 1938, p. 18; PME 1944, p. 37).

*Dyschirius neresheimeri* Wgn.  
 (E.M.D. 1915, p. 241)

### Distribution

*Sweden:* Only 1 specimen: Upl Runmarö (HFS, ex coll. LÖ, coll. LTH). There is no reason to suspect erroneous labeling. This occurrence was, however,



probably accidental.

Absent in the rest of Fennoscandia.

*Adjacent regions:* Missing in Denmark. Not known in Estonia. Latvia, Ziemeļi, 1898 (LCK and MIK 1939, p. 50). Not on the British isles.

*Total area:* Probably solely European species. Distribution very poorly known since the species was earlier confused with *nitidus*. Known to date from: Germany (HOR 1941, p. 98), Holland (EVS 1922, p. 14), Poland (TEN 1931, p. 329), Memel region and Russia, Kiev (WSB 1924, p. 47).

#### Ecology

In Germany the species was found partly on sandy bank of a pond and partly on loamy soil near a brickwork (HOR 1935a, p. 18). Its association with species of *Bledius* apparently not observed.

447

#### Biology

Periods of development not known.

#### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

#### *\*Dyschirius nitidus* Dej.

##### Distribution

*Finland:* Found only in the extreme southeast, four localities on both sides of Ladoga: Ik Uusikirkko, Vammeljoki (KRG 1925d, p. 12! PRT; LTV; PFF); Muolaa (PFF); Metsäpirtti (KRG! PRT; PFF). Kl Salmis (PFF, N.E. 1938, pp. 125, 127).

Doubtful: "Nylandia" (MKL, according to SBJ 1873, p. 67; 2 specimens, MH!).

Erroneous: Kl Parikkala (SBJ l.c., = *politus*, MH! MÅ!).

*Russian sector:* Not known to date.

Absent in the rest of Fennoscandia.

*Adjacent regions:* Absent in Denmark. Also not known in Estonia; on the other hand, three localities in Latvia (MIK 1905). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 332).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 53), southern Italy, Sicily, Malta (LUI 1929, p. 54), Greece (APF 1904, p. 70). Northeast as far as Pechora (PPP 1907c, p. 307). The Caucasus (ECH 1930a, p. 144; 1930b, p. 214). Iran (BOD 1927c, p. 19). Western Turkestan

(MÜL 1922, p. 63). Siberia (among others, SBJ 1880, p. 9; RM!), east as far as Lena (PPP 1906b, p. 25) and Ussuri (MDL 1931, p. 4).

### Ecology

Within the region apparently a stenotopic river bank species, which lives on humus-mixed, weakly overgrown, fine sandy slopes (PME and PFF 1943, p. 130). In Central Europe also on shores of ponds and in brickworks (Dahl 1928, p. 47). Always together with species of *Bledius*; *Bledius pallipes* Gr. and *litoralis* Heer (PME and PFF, l.c.), *longulus* Er. (N.E. 1934, p. 128), *subterraneus* Er. (KRG 1925d, pp. 12–13); in the rest of Europe also with *opacus* Block (DEV 1924, p. 23) and *atricapillus* Germ. (E.M.M. 1913, p. 187); purportedly also together with species of *Heterocerus* (DEV l.c.).

448

### Biology

In Central Europe the larva develops in summer and the adult emerges in autumn (BUR 1939, p. 66). Hibernation therefore certainly occurs in the adult stage, which is indicated, for example, by numerous records during spring in Thüringen (Rapp 1933, p. 30).

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*\*Dyschirius obscurus* Gyll.

### Distribution

**Sweden:** Found only at the seashore within three separate areas. I. On the western coast between Skå Trälleborg, 1862 (coll. THS, ML!) and Hll Särö (WIB, 3 specimens, coll. LTH); Boh Orust, July 1928, 1 specimen (Palm, E.T. 1932, p. 233), Nösund, June 21, 1928, 1 specimen (LTH). In continuation with this, also in the Sandhammaren region in southeastern Skå (several collectors!). To date not known between Skå Limhamn (ÅGR!) and Hll Östra-Karup (several collectors!). Noteworthy is the record near Hll Vessige, Sjönevadssjön, numerous (FGQ!), nearly 20 km from the sea. II. Öld Böda, August 1937, 1 specimen (HNS, RM!). Gtl Gnisvård, July 1, 1927, 1 specimen (LOH!); Fårön, Sudersand, frequent (several collectors!). III. Vbt Byske, July 15, 1936, frequent (LTH). Nbt Pitsund, July 16, 1936, frequent (LTH); Luleå-Skärgård, Sandön, Klubbviken, July 7, 1939, 1 specimen (LTH).

Doubtful: Vgl Göteborg (GLL 1896, p. 5; no voucher specimen).

Erroneous: Vst (ANK, VA! Without doubt wrongly labeled; see *impunctipennis*).

Norway: Exclusively in 6 Jæren, three localities, locally frequent (HLS 1915, p. 13; N.E.T. 1923, p. 246!).

Doubtful: 6 Ryfylke (see N.E.T., l.c.).

Finland: Distribution extremely split. I. In the southwest: NI Hangö, Henriksberg, 1927, 1928 (KRG 1932, p. 278!); Tvärminne (SAA! WEG). II. In the Isthmus of Karelia numerous localities, west as far as Ka Viborg (MNH, MH!), north as far as KI Kexholm (KRV). East of lake Ladoga in KI Salmis, two localities (several collectors! N.E. 1938, p. 132; 1942, p. 176). Also at Tytärsaari in the Gulf of Finland (HLL! SAA!). III. On the shore of the Gulf of Bothnia, several localities, between Om Jakobstad (LBÅ) and Ob Uleåborg and Hailuoto (WUO 1910, p. 64; MH! MÅ! KRG 1932, p. 293!). IV. Three widely separated inland records: Kb Kontiolahti (KRG 1932, p. 248!). Ok Kajana, 1 specimen (CRP!). Li Ivalo (HLL! RNK), 1938, 1939 (KRV!).

Russian sector: Only at Ladoga, three localities (PPP 1899a, p. 8; MH! PFF! KNG!).

Adjacent regions: In Denmark very local but widely distributed, also on Bornholm (West 1940, p. 9 and in litt.). In Estonia widely distributed (HAB in litt.), especially at the coast (KRG 1925e; SUM 1931; Palm!), including Runö and Dagö, but also at lake Peipus (also HDS!). Latvia (SDL 1872; LBÅ 1924b; KRG 1925e; LCK and MIK 1939). From the Leningrad region not reported to date as far as I know, but could hardly be missing. British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB 1902, p. 563).

Total area: Western Palearctic species. In Europe predominantly on the Baltic Sea coast and in the west, south only as far as northern France (DEV 1935, p. 22). Inland records in eastern Germany and Austria (HOR 1941, p. 97), Poland (MÜL 1922, p. 60; WSB 1924, p. 46), Bukovina (JAC 1905–1908, p. 272), in Russia near Dnieper and Volga (JAC, l.c.; MÜL, l.c.). Recorded from Pechora region (SBJ 1898, p. 338), which appears doubtful. At the Caspian Sea, among others in Turkmenia (JAC, l.c.).

### Ecology

In Scandinavia (with one exception; see Hll above) occurs exclusively on the seashore, in Finland at Ladoga and also three inland localities (see above). In the rest of Europe various inland localities also known; the species is not "halophilous" (see LBÅ 1931, p. 164). The species lives everywhere on totally barren, very fine sand (according to KRG 1932, p. 100, it is a stenotopic quicksand species), often together with *thoracicus* but with somewhat higher average requirement for humidity, and hence normally somewhat closer to water or in more moist soil depressions. Usually occurs in very large numbers. In our region almost constantly together with *Bledius arenarius* Payk., rarely



(in Finland) with *fuscipes* Rye and *opacus* Block (KRG 1925d, p. 10), and in the rest of Europe additionally *subterraneus* Er. (JHS and HLB 1902, p. 563; E.B. 1930, p. 186) and *tricornis* Hbst. (LRN 1936, p. 128); might possibly attack species of *Heterocerus* also (DEV 1924, p. 23). The temperature range of this beetle is somewhat less than that of *thoracicus*, but its resistance to water greater (KRG 1932, pp. 146, 237).

450

### Biology

Swedish catches: V: 2; VI: 20; VII: 14; VIII: 7. In Denmark larvae observed at the end of July and the beginning of August (LRS 1939, p. 319). Near Vbt Byske, however, I found three immature beetles already on July 15. It is thus possible that development in the north spans a period of two years. In the south hibernation might always take place in the adult stage (LRS l.c., p. 369).

### Dynamics

Wings fully developed. Spontaneous flight observed in Denmark (LRN in litt.) and Germany (LNG 1929, p. 38).

### *\*Dyschirius politus* Dej.

#### Distribution

*Sweden:* Very local but widely distributed. Forms a continuous belt of distribution from Nbt as far as southeastern Norway across the central Swedish lake region, where the southernmost localities are: Boh Bullaren, Naverstad, 1933 (LTH); Vrm Säffle, 1933 (LTH); Nke Vintrosa, 1939 (LBL, RM!); Örebro region (JNS! NYH!); Vst (perhaps Västerås region, JHN, VA!); Upl Forsmark, 1936 (LTH); Gräsön, 1930 (SJB! JNS!). Northernmost localities: Lul Pålkem, July 1942, several specimens (WRN); Nbt Överkalix, Nedre Rödupp, July 27, 1938, 1 specimen (LTH). In southern Sweden distribution split. Western Skå, north as far as Hälsingborg (VNS, ML! BRK); also near Degeberga in the east, 1851 (BOH 1851, p. 60; "Scan. aren.," 2 specimens, RM!). Öld, four localities. Gtl, six localities, but only in the west. Små Kalmar (WLN, LG!); Ryssby, 1923 (GTZ!); Värnamo, on the Lagan River, 1936, 3 specimens (LTH). Vgl Limmared, 1936, 3 specimens (LTH). On the western coast and the adjacent inland, numerous localities between Hll Åskloster (ERC, MG! ML! WIB, ML! and the Göteborg region (several collectors!). Finally in the Vätter region: Vgl Hjo, 1936, 1 specimen (LTH); Ögl Omberg region, several specimens (Palm!); Motala, Varamon, 1935, 1 specimen (KRG!).

*Norway:* In the southeast continuously distributed, with a total of nine



localities; west as far as 3 Brevik and 16 Hiterdal; north as far as 2 Hokksund; Oslo, Töien; 10 Kongsvinger (all according to N.E.T. 1923, p. 246). Isolated in 6 Jæren, Utsole, 4 specimens (HLS 1915, p. 13), as well as in 13 Sel and 24 Dovre, Jönåi (N.E.T., l.c.).

- 451 *Finland*: I. In the south widely distributed. In the coastal region, however, apparently a gap between Helsinki (PFF) and the Isthmus of Karelia. Northern delimiting localities: Ab Nystad (SDM, MH!); Ta Tammerfors region (several collectors!); Juupajoki (KNG); Sb Kuopio (WLL!); Kb Koli (STN!); Juuka (KRG!). II. Five localities in the Bothnian coastal region between Om Pulkila (SBJ 1873, p. 66; MH!) and Ob Uleåborg (WUO, MH!). III. Ka Salla, Saija (KNG! LFG!).

*Russian sector*: Only in southern Karelia: Sv Gumbaritsa, 1943 (PFF!); Uslanka, 1943 (PFF); Swir (PPP 1899a, p. 8). Kn Velikaja-Guba (PPP l.c.).

*Adjacent regions*: In Denmark not abundant but widely distributed, especially in western Jylland, also on Falster and Sjælland (West 1940, p. 9). Estonia, three localities in the south (SDL 1872; Palm! HAB in litt.); Latvia (SDL 1872; KRG 1925e). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB 1902, p. 564). Shetland (West 1930, p. 74).

*Total area*: Palearctic species. In Europe south as far as central France (DEV 1935, p. 22), northern Italy (LUI 1929, p. 54), Transylvania (PTI 1912, p. 12). Iran (BOD 1927c, p. 19). Siberia (HEY 1880–1881, p. 16; GGL, W.E.Z. 1906, p. 266; MST, N.E.T. 1923, p. 246), east as far as Lena (PPP 1906b, p. 25).

### Ecology

In our region predominantly occurs on running waters, more seldom on stagnant waters, where it is usually found at very small pools and ditches (e.g., sand pits); only singly at the sea. Especially characteristic of the intermediate reach of larger rivers, where the banks are made of fine sand with a thin surfacial layer of loamy mud. The species lives at somewhat drier places than *thoracicus* and hence farther away from water and usually in terrace-like places that are not completely barren, but overgrown with solitary *Carex*, *Equisetum*, *Ranunculus reptans*, and similar plants, often in addition with patches of very fine moss. It is constantly found together with species of *Bledius*, in our region usually *Bledius fuscipes* Rye, *opacus* Block and *longulus* Er., in addition to *subterraneus* Er. and *talpa* Gyll., accidentally also *arenarius* Payk. (Upl) and *tricornis* Hbst. (Al; PME and PFF 1943, p. 130). In the rest of Europe, additionally encountered with *B. spectabilis* Kr. (FWL 1887, p. 22), *denticollis* Fauv. and *vilis* Mäkl. (N.E. 1925, p. 115), *dissimilis* Er. (E.M.M. 1925, p. 143), and *nanus* Er. (DEV 1924, p. 23).

## Biology

Southern Swedish catches: V: 11; VI: 38; VII: 12; VIII: 1. In Denmark pupae and immature adults observed in August (LRS 1939, p. 369; West 1940, p. 10). Spring breeder, hibernating as an adult. Near Vbt Kusfors, on June 21, 1930, a beetle was seen consuming *Bledius fuscipes* (LTH).

## Dynamics

Wings fully developed. Near Gtl Visby, one beetle induced to flight upon exposure to sun under glass. Spontaneous flight observed in Carinthia in the evening (SZM 1907, p. 121).

*Dyschirius rufipes* Dej.

## Distribution

*Finland*: Only two localities in the extreme southeast: Ik Uusikirkko, Viisjoki (PME, S.H.A. 1939, p. 86). Kl Salmis, 1938, 3 specimens (PME, PFF: N.E. 1938, pp. 127, 130!).

Not known in the rest of Fennoscandia (or the Russian sector). Absent in all adjacent regions.

*Total area*: Euro-Caucasian species. In Europe markedly eastern, west only as far as Austria (HOR 1941, p. 108) and Hungary (KTY 1900, p. 26); south as far as Transylvania (PTI 1912, p. 13) and Russia, Astrachan'; east as far as Ural (JAC 1905–1908, p. 274). The Caucasus (according to CKI 1927–1933, p. 539).

## Ecology

The few Finnish specimens were found on clayey fine sand slopes of river banks (PME and PFF 1943, p. 131). Also collected in Central Europe on sandy soil (HEB and MEX 1933, p. 62), among others in the wet lowlands of the Danube River (DLT 1879, p. 17); additionally purportedly found in *Talpa* hillocks on loamy soil (HOR 1941, p. 108), as well as "in nests of ground squirrels and ants" (BUR 1939, p. 67). At any rate the species apparently has no association with species of *Bledius*.

## Biology

Nothing is known about the periods of development.

Examination of a specimen from Vienna revealed that the wings are reduced to a broadly rounded rudiment that barely reaches half the length of an elytron. The species, habitually always similar to the brachypterous *globosus*, might likewise be flightless.

*\*Dyschirius salinus* Schaum.

Distribution

*Sweden*: Exclusively at the sea. Along the western coast quite possibly continuously distributed between Skå Trälleborg (numerous, at least since 1861; MLF, MG! THS, ML!) and Boh (Vst, certainly Ljungkile region, MG!). Also: Små Kalmar (WLN, 2 specimens, LG!). Gtl Hamra, 1925, 3 specimens (JNS!); Burgsvik, 1924 (JNS!); Klinte, 1926 (JNS!); Lau, 1942 (BGW!); Lärbro, Vägome, 1942, 7 specimens (BGW!).

Erroneous: Öld (BOH, RM = *ludersi*! Böda; according to a manuscript in K.V.Ak.).

*Norway*: Only four localities on the seashore of the southeast: 1 Hvaler, Kirkeøy, 1915 (NTV, MO!). 2 Oslo, two localities (HLS 1891a, p. 12). 3 Tönsberg (HLS l.c.). 4 Jomfruland (all in N.E.T. 1923, p. 247).

*Finland*: Only in the extreme southwest on the sea. Al Jomala, 1922, several specimens (LBÅ 1924a, p. 31! Later by STK and PFF); Sottunga (LBG!); Kökar (LBG). Ab Nystad (SDM, 16 specimens, MH!). Nl Hangö, Täcktom, July 1937 (LBG!).

*Russian sector*: Absent.

*Adjacent regions*: In Denmark widely distributed and rather frequent, but to date not found on Bornholm (West 1940, p. 10). Estonia, only on the western coast, including Nuckö, Ösel, and Dagö (LBÅ 1924b; HAB 1936a; HAB and LCK in litt.). Latvia, Papenhof, 1938 (LCK in litt.). Not known in the Leningrad region. British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB 1902, p. 564).

*Total area*: Western Palearctic species. In Europe predominantly on the western coast, south as far as southern France (DEV 1935, p. 23). Also at the Mediterranean Sea, south as far as the Balearic Islands (FUE 1919, p. 55), Corsica (DEV l.c.), central Italy, Sardinia, Sicily (LUI 1929, p. 54), Greece and Crete (QTZ 1886, p. 206), east as far as Macedonia (APF 1904, p. 71). At the Black Sea in Bulgaria (APF l.c.) and southern Russia (MÜL 1922, p. 72). Along inland saline places, found in several countries, north as far as Holstein (HOR 1941, p. 101). Northern Africa (BED 1895–1914, p. 49). Asia Minor (APF l.c.). Syria (MÜL l.c.). The Caucasus, at the Caspian Sea (SDR and LDR 1878, p. 64; JAC 1905–1908, p. 274), Kirgizia (HEY 1880–1881, p. 15).



## Ecology

Within the region occurs exclusively on seashores, in Central Europe also found at inland saline places; undoubtedly a halobiont (LNG 1929, p. 36). Lives on moist loamy soil, frequently with an admixture of sand or humus, usually in the immediate vicinity of sea water, even at places flooded during high tide. Often loose vegetation of the marshy meadow type present; however, the species also occurs on barren soil and sometimes under seaweed. Often together with *ludersi*. In our region found particularly with *Bledius fuscatus* Ol. and *diota* Schiø. (LBÅ 1924a, p. 31; Palm, E.T. 1943, p. 75), in the rest of Europe also with *unicornis* Germ. (DEV 1924, p. 24), *spectabilis* Kr. (D.E.Z. 1926, p. 305), *tricornis* Hbst. and *opacus* Block (LRN 1936, p. 219), and *arenarius* Payk. (BUR 1939, p. 69). It is not certain whether this species is completely dependent on species of *Bledius*, since reportedly species of *Heterocerius* and *Trogophloeus* also occur rather regularly in the biotope (DEV l.c.; LRN l.c.; BUR l.c.).

## Biology

Swedish catches: III: 1; IV: 2; V: 9; VI: 11; VII: 11; VIII: 4. In Denmark, where most specimens have been collected in May (LRS 1939, p. 320), a pupa was found at the beginning of August (West 1940, p. 10). It is certainly a spring breeder, hibernating as an adult.

## Dynamics

Wings fully developed and certainly functional. Flight observations absent to date however.

*\*Dyschirius septentrionum* Munst.  
(N.E.T. 1923, p. 248)

## Distribution

*Sweden*: A northern species, distributed in three subareas. I. In the fjelds: Tol Björkliden, 1928, 1 specimen (E.T. 1930, p. 48; BRD 1931, p. 9; 1934, p. 219), 1939, 1 specimen (LTH); delta of Vadvejokk, several specimens (BRD 1934, p. 219; LTH). Lul Sarek region, two localities (JNS 1926, p. 907; "*ludersi*"). Rapa delta, August 17, 1939, 5 specimens (LTH). Jtl Jorm, Vallån, 1932, frequent (JNS and Palm, E.T. 1936, p. 183). II. Bothnian coastland from the Finnish border as far as Jtl Bispgården, 1930 (LTH and Palm 1934, p. 34!) and Mdp Njurunda. Bank of Ljungan, July 5, 1936, 6 specimens (LTH). III. Vrm, two localities: Vingäng, 1933, 1 specimen (Palm and LTH 1937, p. 116!); Lundsberg, on the bank of a small river, June 1936, September 1940, numerous (WRN!).



*Norway*: I. North of about latitude 66° N widely and apparently continuously distributed as far as southern Varanger, northernmost near latitude 70° N in 38 Alta and Porsanger (several collectors; N.E.T. 1923, p. 249; STA in litt.), as well as near 40 Nuorgam on Tana-elv (PPP 1905, p. 87). In Lofoten the species appear to be absent. Southernmost locality of the northern area: 31 Mosjøen (LYS, according to STA). II. In the southern half found in five localities in the Trondheim region (N.E.T. 1937, p. 144), and additionally near 25 Røros (N.E.T. 1923, p. 249; 1937, l.c.); 24 Krokhaug in Folldal; 10 Kongsvinger (N.E.T. 1923, l.c.).

*Finland*: Two widely separated areas. I. In the southeast on both sides of Ladoga, especially in the Isthmus of Karelia, numerous localities (several collectors!), west as far as Ka Viborg (LBG, MH!), north as far as Kl Salmis, two localities, numerous (PFF, N.E. 1938, pp. 125 ff.). Isolated near Kb Liperi 1940, 1 specimen (PME!). II. Throughout northern Finland, south as far as Ob Kemijärvi (SBJ, MH!) and Ks Kuusamo (several collectors!). In the Bothnian coastland (possibly with a gap around latitude 64° N) even as far as Oa Malax, 1940 (LBÅ) and Kauhajoki (KNG!).

*Russian sector*: Kola Peninsula, only two localities in the west: Lt Nuortijärvi and Lutto, 1899 (PPP 1905, p. 87, "*aeneus*"; MH!). In southern Karelia, seven localities on Ladoga and Swir (PPP 1899a, p. 8, "*aeneus*"; MH! MÅ! PME! PFF! KNG!).

*Adjacent regions*: Absent in Denmark. Estonia, two localities on the northern coast (LTH 1943a). Not known from Latvia and Leningrad region.

*Total area*: Palearctic species. In Europe, outside the region, only on the Kanin Peninsula (PPP L909, p. 5, "*aeneus*"; LTH 1943a, p. 4). Siberia, Ob and Lena regions (LTH l.c.).

### Ecology

Quite predominantly found on river banks, less often at stagnant waters, usually very small pools or ditches; also at the seashore, the Gulf of Bothnia, and the Arctic Sea (LBÅ 1933, pp. 115 ff.). Always on more or less loamy soil, but often on sand with only a thin surfacial layer of loamy mud, even on peat soil. Usually on more or less barren patches among sparse vegetation of *Carex* and similar plants, frequently under the shade of *Salix*, *Alnus incana*, and similar plants. The species is generally associated with members of *Bledius* and has been found repeatedly in their tunnels: *Bledius pallipes* Gr. (KRG 1925d, p. 14; N.E. 1934, p. 128; PME and PFF 1943, p. 130), *fuscipes* Rye (Jtl), *arcticus* J. Sahlb. and *poppiusi* Bernh. (KRG l.c.; N.E. 1942, p. 55), *vilis* Mäkl. (N.E. 1934, p. 128), *longulus* Er. (N.E. 1923, p. 121; KRG l.c., p. 12; PME and PFF, l.c.), *bosnicus* Bernh. (Jtl; Tol; N.E. 1934, p. 128), *talpa* Gyll (N.E. l.c.), *subterraneus* Er. (Vrm; KRG l.c., p. 12; N.E. 1934, l.c.; PME and PFF, l.c.; PFF 1943, p. 86). Total dependence on species of *Bledius* cannot be

assumed, however, since the species also lives in places where *Bledius* is absent. I do not know the source of BUR's (1939, p. 69) record of its occurrence among various species of *Heterocerus*. The species ascends regularly into the *reg. bet.*; in the *reg. alp.* found only on the Kanin Peninsula (PPP 1909, p. 5, "*aeneus*").

### Biology

Swedish catches: VI: 24; VII: 14; VIII: 2. Immature beetles found July 13 (Vbt), July 30 (Lul), August 10 (Ik). Hibernation certainly takes place in the adult stage. But in view of the earlier time of emergence in the north, it is still not certain whether half-grown larvae also hibernate and development there requires a period of two years.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*\*Dyschirius thoracicus* Rossi  
(*arenosus* Steph.)

### Distribution

*Sweden*: I. Widely distributed in southern and central Sweden, but occurs much more sparsely in the east. The species seems to be absent on the coast between southern Små and southern Sdm, but primarily throughout the region  
457 of lake Mälär. Between latitude 60° N and 62° N it is likewise remarkably rare. Northernmost localities: Vrm Gräsmark, 1923 (SDN, MG!); Dlr Mora, three localities, 1937, several specimens (KLF!); Gst Torsåker, Malmjörn (KLF); Upl Gräsön (SJB); Hls Norrbo (SJB); Mdp Njurunda, Björkö, July 6, 1936, 3 specimens (LTH). II. In the north numerous localities in the Bothnian coastland, north as far as Nbt Kypäsjärvi, July 26, 1938, numerous (LTH), south as far as Vbt Byske, July 15, 1936, frequent (LTH). Additionally, isolated near Lyl Lycksele, at the river, July 19, 1936, 1 specimen (LTH). It is not improbable that the two areas shown as separate in the map are actually continuous, since suitable places (sandy shores) on the coast of central Norrland are rare and, at any rate, have not been sufficiently investigated.

*Norway*: Exclusively at the sea, from the Swedish border as far as 6 Jæren (five localities, very frequent; HLS 1915, p. 13) apparently continuously distributed, north as far as Oslo region (N.E.T. 1923, p. 246). In the north (latitude 66° N) one completely isolated locality: 31 Langøybukt, May 1910, 1 specimen (MST, N.E.T. l.c.).

Doubtful: 6 Ryfylke (see N.E.T., l.c.).

*Finland:* South of latitude about 66° N uniformly and uninterruptedly distributed; north as far as Ob Rovaniemi (EHN, MÅ!); Ks Posio (NSL); Paanajärvi (several collectors!). In the high north, two isolated localities: Li Ivalo, 2 specimens (HLL!), June 1939, 2 specimens (KRV!). Lp Yläluostari, several specimens (HLL! THG).

*Russian sector:* In the southern part of Kola Peninsula between Lm Dschyn (PPP 1905, p. 87) and Lv Kusomen (HLL!). In Karelia near Kk Soukelo (SBJ 1873, p. 65; MH!); Kc Segosero (PPP 1899a, p. 8; MH!) and at several localities in the south (several collectors!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 9). In Estonia very widely distributed, also on Runö, Ösel, Dagö, Wormsö (LBÅ 1924b; KRG 1925e; SUM 1931; HAB 1936a and in litt.; Palm!). Latvia (several authors). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 332), also Ireland (JHS and HLB 1902, p. 563).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 52), central Italy (LUI 1929, p. 54), Dalmatia (according to HOR 1941, p. 96), southern Russia (MÜL 1922, p. 60). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306). Inland records in Central Europe are predominantly from the northeast; in Germany, in recent years, the species appears to have receded from the southern and central parts (HOR 1941, p. 96). Northern Africa (BED 1895–1914, p. 48). Syria (according to CKI 1927–1933, p. 520). The Caucasus (SDR and LDR 1878, p. 64). Kirgizia (JAC 1905–1908, p. 272), western Siberia (JAC l.c.).

## Ecology

This is the least stenotopic of the species of *Dyschirius* associated with *Bledius*. It lives as readily at fresh water as at the sea (in Norway strangely found only at the sea; N.E.T. 1923, p. 246), at stagnant as well as running, large as well as small bodies of water, and is usually found in extremely large numbers. It is most frequent on fine pure sand or that containing a slight admixture of mud, but also tolerates a considerable admixture of loam and (compared to *obscurus*) more coarse sand. Almost always in completely barren places and usually in the immediate vicinity of water. Rarely in sand pits where the water dries up in summer. Also in Central Europe, comparatively eurytopic (see GRD 1937, p. 40). In Sweden constantly found only with *Bledius talpa* Gyll. and *arenarius* Payk., in Finland also found together with the following species: *arcticus* J. Sahlb. (N.E. 1934, p. 128; PFF 1943, p. 85), *longulus* Er. (N.E. 1923, p. 121), *opacus* Block (PFF l.c.), *subterraneus* Er. (N.E. 1923, p. 121; 1934, p. 128; PFF 1943, p. 86). In Central Europe associated with many other species (DEV 1924, p. 23; LRN 1936, p. 127; BUR 1939, p. 69). Whether *thoracicus* can do without species of *Bledius* and survive solely on species of *Heterocer* (BLK 1925, p. 18; BUR l.c.), requires particular investigation.



## Biology

Southern Swedish catches: IV: 1; V: 26; VI: 62; VII: 37; VIII: 14; IX: 2. Numerous immature beetles found between July 15 (Vbt) and September 9 (Ögl). In Denmark larvae and pupae found in July and August and immature adults observed already from the end of June to November (LRN 1936, p. 126; LRS 1939, pp. 319, 368; West 1940, p. 9). Hibernation takes place in the adult stage (LRN l.c.); whether this happens in the northern part of our region constantly and without exception also, is rather uncertain in view of the surprisingly early dates of emergence there (Vbt, July 15; Nbt, August 9).

## Dynamics

Wings fully developed and certainly functional. LRN (in litt.) reportedly has observed the spontaneous flight of specimens in Jylland.

459

### *Elaphrus angusticollis* F. Sahlb.

(*jakovlevi* Sem.; for other possible synonyms, see below)

### Distribution

(map in PME and PFF 1943, p. 179)

*Finland*: Found exclusively in the extreme southeast, with only one locality on either side of Ladoga, and quite numerous. Ik Metasäpirtti, Viisjoki, since 1929 (KTK 1929; N.E. 1929, p. 126; MH! Later found by several collectors!). Kl Salmis, Miinalanjoki, June 1938, not rare (PFF, N.E. 1938, pp. 125–127!).

Absent from the rest of Fennoscandia; also not found to date in the Russian sector.

*Adjacent regions*: Absent in Denmark and also unknown in the Baltic States. On the other hand, found in Leningrad region (BSK 1929, p. 146), among others, near Jamburg, June 8, 1908, close to the Estonian border (BSK 1908a, p. xxxix; several specimens in coll. LBG!).

*Total area*: Palearctic species. In Europe predominantly northeastern (the localities in Finland are westernmost), in central Russia south at least as far as Twer† and Gorki (SEM 1898, p. 76). In the northeast, also in the Pinega and Mezen regions (PPP 1908, p. 5), as well as near Pechora (SBJ 1898, p. 338). In Siberia widely distributed (among others, SBJ 1880, p. 11), east as far as Yakutsk (HEY 1880–1881, p. 4). Lena (PME, S.H.A. 1944, p. 22), Okhotsk and Sakhalin (SEM 1904b, p. 120).

†(Today known as Kalinin; suppl. gen. edit.).



## Ecology

In Finland the species seems to be a stenotopic inhabitant of river banks (PME and PFF 1943, p. 129). It lives there on fine sandy and loamy scarps with more or less weakly developed soil vegetation, often under the shade of bushes and at a distance from water. It is less hygrophilous than our remaining species of *Elaphrus* and not so markedly heliophilous as *riparius*. In the remaining parts of its area the species likewise seems to live stenotopically on river banks (S.H.A. 1944, p. 24).

## Biology

Nothing is known about the periods of development.

## Dynamics

- 460 In the four specimens from Finland examined by me the wings are far less developed than in the remaining species of *Elaphrus* in our region. Their surface constitutes not even one-half that of a usual large *riparius* wing, and the reflexed apical part in particular is very short. These specimens must be considered flightless. I do not know whether macropterous individuals occur additionally in Finland or in other parts of the area.

## Systematics

According to SEM (1904b, pp. 119–120) *angusticollis*, *jakovlevi*, and *angustus* Chaud. (= *longicollis* J. Sahlb.) are separate species. However, PME (S.H.A. 1944, pp. 17 ff.) has indicated the possibility (also by examination of the male genitalia) that all these forms only constitute a single, highly variable species. His conclusion is presumably correct, but needs to be checked based on more extensive Siberian material.

## \**Elaphrus cupreus* Dft.

### Distribution

*Sweden*: Found in all the provinces and distributed continuously throughout the country, except for the actual fjelds. Northernmost localities: Tol Björkliden (ERL!), July 17, 1939, 1 specimen (KRG, coll. LTH); Jukkasjärvi (ZTT 1828, p. 3, "*uliginosus*"); Övre-Soppero, July 1932 (ERL, coll. BRD!); Karesuando (ZTT l.c.), 1930, 1935 (BRC, RM!).

*Norway*: Except for the northernmost peninsulas and the actual fjelds, probably continuously distributed throughout the country; not recorded to date only on the extreme southern parts of the coast. Northernmost locali-

ties: 36 Nordreisa (STE, MB!); 38 Alta (several collectors; MO!); Lakselv in Porsanger (several collectors); also in southern Varanger, numerous localities (SPS 1894, p. 57; STA).

*Finland:* Except for the actual fjelds, distributed throughout the country without recognizable gaps.

*Russian sector:* On the Kola peninsula four localities in the west and south, east as far as Lv Kusomen (HLL, MH!). In Karelia certainly continuously distributed, but in the northern and central parts to date only one locality known for each (PPP 1899a, p. 9; 1905, p. 87; MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 8). Estonia (HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 328), also Ireland (JHS and HLB 1902, p. 562). Shetland (West 1930, p. 74).

461 *Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 21), northern Italy (LUI 1929, p. 50). Bosnia (APF 1904, p. 66). In the northeast as far as Pechora (SBJ 1898, p. 338). Trans-Caspian region (JAC 1905–1908, p. 267). Siberia (among others, SBJ 1880, p. 10; RM!), east as far as Trans-Baikal (HEY 1880–1881, p. 4; MDL 1931, p. 3) and Lena (PPP 1906b, p. 24).

### Ecology

Found at very humid places, always in the vicinity of water. Usually occurs at stagnant, very small as well as large, bodies of water, but also found at slow-flowing waters, less often at the sea. The species requires some shade and is therefore not found on totally barren banks. On the other hand also lives in deciduous forest swamps and at forest ponds where there is strong shade. The species seems to require some admixture of humus in the soil and is hence not found on pure sand and gravel; otherwise found on loam, “dy†,” gyttja†, peat, and extremely sandy, gravelly, or stone-mixed soil. It prefers banks with bald patches over those with a continuous cover of vegetation. Vegetation (consisting of species of *Carex*, *Scirpus silvaticus*, *Phragmites*, and similar plants) may be quite tall; often found in places densely covered with moss, but occurs only singly in *Sphagnum*. Occurs at eutrophic as well as oligotrophic and dystrophic waters. In the fjelds it frequently reaches the *reg. bet.*; it is known from the *reg. alp.* only from Norway (STA in litt.) and northern Finland (1 specimen; N.E. 1942, p. 50), and is apparently missing in the tundra.

†(cf. pages 46 and 69; suppl. scient. edit.).

## Biology

Southern Swedish catches: IV: 3; V: 65; VI: 133; VII: 60; VIII: 28; IX: 7. Numerous immature beetles found from July 22 (Lyl) and July 25 (Boh) to August 27 (Ögl) and September 9 (Nbt). In Denmark maximum abundance already in May, and numerous larvae have been found from the end of June until August (LRS 1939, p. 318). Spring breeder, hibernating as an adult.

## Dynamics

Wings fully developed. One beetle was induced to flight May 24, 1942 (Upl Djursholm), upon exposure to sun under glass. A few specimens have been found in sea drift in Finland (PME 1944, p. 37).

## Fossil Records

Finland (NI), postglacial (PPP 1911, p. 36). England, "arctic" (Bell 1922, p. 46).

462

*\*Elaphrus lapponicus* Gyll.

## Distribution

(map in LTH 1935b, p. 585)

*Sweden*: Found exclusively in the fjelds. Tol Abisko region (several collectors!), also in the delta of Ortojokk, July 16, 1941 (Holm and WSJ!); Karesuando, Kuttainen, June 1935 (BRC, RM!). Lul Kvickjock, July 20, 1843, 1 specimen (BOH 1844, p. 100; manuscript in K.V. Ak.); Sarek, without further locality data, numerous (JNS 1926, p. 907; RM!). Pil Pjeskejaure, July 8, 1925, 1 specimen (LTH 1935a, p. 38!). Lyl Syttertuppen, on snow field in *reg. alp.*, June 26, 1935, 1 specimen (RDB, ML!). Jtl (GLL 1896, p. 8; leg. ?, 1 specimen, RM!). Dlr Idre (AND, according to GLL, l.c.; 2 specimens, LF).

*Norway*: Distinctly bicentric. I. In the fjeld regions of the central south, total of 13 localities, south as far as 22 Holvik near Mjösavatn (MST) and Sandhaug in Hardangervidda (HLG, according to STA), north as far as 25 Röros (MST) and Aursundsjö (CTT). II. In the north probably continuously but somewhat unevenly distributed from 32 Rössvatn (STE, MO!) as far as 41 southern Varanger (five localities), chiefly in the coastal regions. Northernmost localities: 38 Kolvik in Porsanger; 40 Tana (MST).

*Finland*: A northern species; rare, but widely distributed in Lapland (in the collections there are many old specimens without more precise locality data). Lp, three localities (HLL! KRV! LNN, MÅ!). Li Utsjok (KRG!). Lk Muonio (several collectors!) Jerisjärvi (SBJ 1873, p. 69); Kittilä (SAD, MH!); Sodankylä (SUD, MH!). Ob Ylitornio (RNK 1938, p. 65). Ks Paanajärvi, several

specimens (KRG!). Ok Ruhtinassalmi (SSK, numerous collections!). Southernmost, isolated near Sb Kuopio (ENW, 1 specimen, MH!).

*Russian sector:* Only one locality in the western part of Kola Peninsula: Lt Nuorti (FSI, 1 specimen, MH!).

*Adjacent regions:* Absent in Denmark. In eastern Latvia discovered at lake Luban (ULN 1884, p. 8; LMN 1913). British Isles: northern England, Scotland, Orkney (LTH 1935b, p. 585).

*Total area:* Palearctic species (possibly circumpolar). In Europe Boreo-British, doubtful from Russia (JAC 1905–1908, p. 267). Siberia (“Sib. arct.,” SEM, H.E.R. 1895, p. 310), probably occurs only in the east: Lena (PPP 1906b, p. 24); Kamchatka (HEY 1880–1881, p. 4). Doubtful from North America (Leng 1920, p. 45).

463

### Ecology

Predominantly a bog animal which, however, is not at home in the acidic *Sphagnum* bogs but in the neutral alkaline hypnum moss bogs (“Braunmoore”) (KRG 1939, PFF 1943, p. 96). It is especially typical for very small bogs located on the fjeld slopes close to springs or brooks, and also at ponds or puddles with cold water (SPS 1888–1889, p. 98; 1910a, p. 68; PPP 1910a, p. 307; KRG l.c.). Near Tol Abisko the species has been repeatedly collected from the surface of a small bog in the immediate vicinity of Abiskojokk, where the moss *Paludella squarrosa* is especially prominent (LTH). There are also some records, usually of only single specimens, from *Sphagnum* (SPS 1889, p. 199; PPP 1906b, p. 24; RNK 1938, p. 65). Predominantly in the *reg. bet.* and the higher parts of the coniferous forest region, in Norway and Sweden solitary specimens also found in the *reg. alp.* (LTH 1935a, p. 25; 1935b, p. 586), where it might actually be native at least in the lower parts. A “stenothermic-stenoionic (coldrequiring) species” with a low temperature preferendum; pH 6.8 to 7.2 (KRG 1939, pp. 1223, 1227).

### Biology

Predominantly a spring insect (SPS 1888–1889, p. 98; PPP 1910a, p. 307) found only singly later in summer. Hibernation undoubtedly occurs in the adult stage.

### Dynamics

Wings fully developed and certainly functional. In Lyl one beetle was found in the Syttertoppen Fjeld, June 26, 1935 (RDB) on a snow field in the *reg. alp.*, which could only have reached there by flying.



## Variation

This species is remarkably variable in color. Specimens vary from emerald-green, coppery, and brass-yellow, to dark blue or almost pure black, etc. No geographic distribution evident in these aberrations.

## Fossil Record

Denmark, northern Jylland, late glacial (HNR 1933, p. 126).

464

*\*Elaphrus riparius* L.

## Distribution

(map in BCH 1938, no. 47)

*Sweden:* Found in all provinces and distributed throughout the country. The gap in the Norrland forest region (between latitude about 64° N and 67° N) might not be actual. Also occurs in the actual fjeld region. Northernmost locality: Tol Karesuando, Kummavuopio, July 11, 1935, 6 specimens (BRC, RM!).

*Norway:* Distributed throughout the country except for the extreme coastal region in the western part of the country, Lofoten, and the northernmost peninsulas. Northernmost localities: 38 Alta and Porsanger (several collectors!); 40 Tana (SPS, according to STA); in 41 southern Varanger numerous localities (SPS 1894, p. 57; STA).

*Finland:* Universally distributed; also in the fjeld regions and on the Arctic Sea coast.

*Russian sector:* On the Kola Peninsula scattered localities, east as far as Lj Ponoj (PPP 1905, p. 88); seems to be absent on the northern coast. In Karelia certainly all over but in the north found to date only near Kk Kunttijärvi (PPP l.c.) and Kr Suma (PPP 1899a, p. 9; MH!); in the south several localities (numerous collectors!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 8). Estonia, including Ösel (HAB 1936a, and in litt.; Palm!); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 328), also Ireland (JHS and HLB 1902, p. 562).

*Total area:* Circumpolar species. In Europe south as far as northern Spain (FUE 1918, p. 48), northern Italy (LUI 1929, p. 50), and Serbia (APF 1904, p. 66). In the northeast as far as Kanin (PPP 1909, p. 5; "*tuberculatus*"), Pechora (SBJ 1898, p. 338), and on Kolgujev Island (SEM 1906, pp. 117, 124). Asia Minor (ECH 1922, p. 31). Iran (BOD 1927c, p. 16). The Caucasus (SDR and LDR 1878, p. 58). Western Turkestan (according to CKI 1927-1933, p. 420). Siberia (among others, SBJ 1880, p. 10; RM!), east as far as Ussuri (MDL 1931, p. 3), Amur (HEY 1880-1881, p. 4) and Kamchatka

(BNN, NET, SBR 1929, p. 2). Northern America, widely distributed (Leng 1920, p. 45).

### Ecology

465 On the shores of stagnant or slow-flowing waters, also at very small bodies of water, less often at the sea. This species is more heliophilous than *cupreus* and tolerates no shade. It therefore always lives on more or less vegetation-poor, often completely barren banks, which are not too soft and consist of sand or loam. It avoids gyttja, "dy†," peat (and also humus); rarely, found along stony or coarsely graveled banks. The two species occur together only at places where rich bank vegetation is interrupted by fairly large bald and hard patches. Its occurrence on open shores has also been noted in Central Europe (see LRS 1939, p. 366; RSH 1842, p. 2; BRN and PTZ 1933, p. 239; GRD 1937, pp. 38, 70). Occurs in the fjelds more regularly than *cupreus*, and constantly native in the lower parts of the *reg. alp.* (LTH 1935a, p. 25; BRD 1934, p. 218; Sarek region, LTH); also found in the tundra of Kola and Kanin Peninsulas, on Kolgujev Island, and in Siberia (PPP 1910a, p. 307).

### Biology

Southern Swedish catches: IV: 2; V: 67; VI: 122; VII: 53; VIII: 13; IX: 0; X: 1. In Denmark, where a maximum abundance also occurs in June, numerous larvae have been observed from the end of June to the beginning of August (LRS 1939, p. 318). I saw immature beetles only from northern Sweden, but in large numbers, from July 29 (Tol) to September 9 (Nbt). Hibernation takes place in the adult stage. In Germany the beetle has been observed spontaneously hunting flies, and in captivity fed on small staphylinids; it is also cannibalistic (GRD 1937, p. 29).

### Dynamics

Wings fully developed. One beetle, August 6, 1939 (Nbt Måttsund), was induced to flight upon exposure to sunlight under glass. Spontaneous flight has been observed in Germany in the evening (GRD 1937, p. 76).

### Variation

This species is extremely variable in color, sculptural characters, and behavior ("habitwell"). This is especially true in the northern part of our region, as well as in northern Russia and Siberia, which has led to the recognition of several

†(cf. page 46; suppl. scient. edit.).

"species" (LTH 1939b). It is not possible, however, to delineate races because all kinds of intermediate forms can be found, even in a series from one and the same locality.

### Fossil Record

Saxony, glacial (NTH 1894, p. 539).

466

### \**Elaphrus uliginosus* Fbr.

#### Distribution

*Sweden*: Distributed almost throughout the country (found in all provinces except Boh, Mdp, and Ång), but its occurrence is so sparse that one cannot speak of continuous areas. Skå, three localities, south as far as Stehag (MLC, HM! leg.?, MU!). Ble (certainly Karlskrona region; ANK, VA!). Hll Släp (SDN, WRG, MG!). Små, four localities. Öld Halltorp, 1921 (LTH). Gtl Ardre, 1929 (Palm); Sandön (MJB, VA!). In central Sweden and lower Norrland somewhat more evenly distributed. Northernmost localities: Jtl Åre (several collectors!) Frostviken, 1 specimen (KLK 1909, p. 55); Lyl Sorsele, July 1931, 1 specimen (GTZ!); Vbt Byske, seashore, July 15, 1936, 1 specimen (LTH); Nbt Notviken, May 26, 1938, 1 specimen (LTH); Lakaträsk, August 15, 1940, 1 specimen (LTH).

Erroneous: Lapland (THS 1859, p. 193; *uliginosus* Ztt. 1828, p. 3 = *cupreus*).

*Norway*: In the southeast rather widely distributed; only solitary localities along the southern coast, west as far as 7 Opsangervatn in Söndhordland (N.E.T. 1923, p. 254; 1930, p. 338). In the eastern valleys extends rather far upwards: 16 Vestfjorddal (MST); 15 Gol in Hallingdal (STE, MB!); 24 Sörem in Vågå; 25 Röros (N.E.T. 1923, p. 254). Farther, in the Trondheim region (N.E.T. 1937, p. 144) as well as in 26 Hitra (N.E.T. 1923, p. 254). Farther north four localities: 32 Ramnå and Bjöllånes (NTV, according to STA); Saltdal, Rognan (N.E.T. 1923, p. 254); Fiskvågvatn (MST).

*Finland*: Rare, but continuously distributed at least south of about latitude 62° N; also on Åland (several collectors!) and on Hogland in the Gulf of Finland (BRR, MH!). Northward more sparsely but probably uninterruptedly distributed; northernmost localities: Ob Kemi (EHN, MÅ!); Ks Kuusamo (MKL, MH!); Paanajärvi, 1935, 1939 (KRG! PFF); Salla (LNN, MH!).

*Russian sector*: Only four localities in the southern half of Karelia: Sv Gubaritsa, 1943 (PFF); Kn Valkiamäki and Tiudie (PPP 1899a, p. 8; MH! FA!); Kr Suma (LEV, MH!).

*Adjacent regions*: In Denmark rather rare, but widely distributed in Jylland as well as on the islands, but not on Bornholm (West 1940, p. 8). Estonia (HAB in litt.), also on Abro Island near Ösel (LCK in litt.). Latvia (SDL

467 1872; ULN 1884; LCK in litt.). Leningrad region (OBT 1876, BSK 1908a); also near Lempaala, 1943 (PHJ in litt.). British Isles (Joy 1932, p. 328), also Ireland (JHS and HLB 1902, p. 562).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 47), central Italy (LUI 1929, p. 50), Serbia (APF 1904, p. 66). Asia Minor and Iran (according to CKI 1927–1933, p. 418). The Caucasus (JAC 1905–1908, p. 267). Turkmenia (HEY 1896, p. 8). Siberia (SBJ 1880, p. 10; RM! HEY l.c.; JAC l.c.), according to CKI (l.c.) east as far as Amur.

### Ecology

Occurs on wet soil, with more or less rich vegetation (primarily rich in moss), usually in the vicinity of stagnant, frequently very small bodies of water, or at the sea. The life requirements of this species are rather enigmatic, since it is highly local in occurrence, frequently downright sporadic, and found in rather diverse biotopes. On the one hand it has been found numerous times on loam-mixed, hard sandy soil with a comparatively poor growth of Juncaceae, species of *Carex*, *Myrica gale*, and similar plants, together with *Agonum 6-punctatum*, *viduum*, and others; on the other hand it occurs on markedly soft peat soil with much richer vegetation of *Carex*, together with *Agonum versutum*, *Blethisa*, etc.; finally, it is often found at springs. The only common feature appears to be the rich occurrence of mosses (e.g., *Amblystegium*, *Paludella*, only rarely *Sphagnum*). Its occurrence on sand as well as on peat has likewise been noted in Germany (RSH 1842, p. 2; LTZ 1847–1852, p. 51).

### Biology

Distribution of the very few dated southern Swedish catches: IV: 1; V: 9; VI: 9; VII: 2. Also in Denmark a very pronounced spring species (LRS 1939, p. 318). Hence there is a definite biological correspondence with *lapponicus*, which is also ecologically related. Hibernation has to take place in the adult stage, and the assumption of larval hibernation (BUR 1939, pp. 58, 59) could only be true exceptionally.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.



\**Harpalus âeneus* Fbr.  
(*affinis* Schrank)

Distribution

*Sweden*: Found in all provinces, and continuously distributed throughout the country except for the fjelds and northern Lapland. Northernmost or highest localities are: Dlr Idre (Sthen, coll. FRL! ML!); Hjd Vemdalen (CDG); Jtl Änn, 1934 (LTH); Åre (AND, LF; BGW); Åsl Saxnäs, 1939 (NST, coll. LTH); Tresund, 1832 (ZTT 1840, p. 38; ("*confusus*"; ML!); Lyl Storuman, 1936 (LTH); Sorsele, collected many times (GTZ, E.T. 1932, p. 50!); Pil Arjeplog, Loholm (WLD, coll. LTH); Lul Jockmock, 1924, 4 specimens (LTH); Porjus, 1939, 1 specimen (LTH); Ullatti, 1938, 1 specimen (LTH); Nbt Tärendö, 1938, 2 specimens (LTH); Pajala, 1938, numerous (JNS, LTH).

Doubtful: Tol Karesuando (GPE, according to ZTT 1828, p. 27; 1840, p. 37; no voucher specimen).

*Norway*: Except for the fjelds, frequent all over from the extreme south just as far as latitude 65° N, usually numerous, sparser in the western part of the country. Northernmost localities: 28 Snåsen (N.E.T. 1937, p. 146; SHY, MO!); 30 Grong (SHY, MO!); 29 Mo on the Folden Fjord (CTT, according to SIE 1875, p. 104).

Doubtful: 32 Saltdal (SMM 1824–1827, p. 98; no voucher specimen).

*Finland*: Universally distributed south of the Arctic Circle. Northern limit represented by the following localities: Ob Pello (MHJ, MH!); Rovaniemi (KNG); Kemijärvi (STK); Ks Paanajärvi (KRG); Salla (LNN, MH!); Lk Muonio (SBJ 1873, p. 127).

*Russian sector*: In southern Karelia frequent, north as far as Kn Semsjärvi (CRP!). Farther north, near Kr Suma (PPP 1899a, p. 17; MH!) and in the high north (possibly accidental), near Lt Kola (PPP 1905, p. 97; MH!).

*Adjacent regions*: In Denmark universal and very frequent (West 1940, p. 25). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 351), also Ireland (JHS and HLB 1902, p. 568). Shetland (West 1930, p. 75).

*Total area*: Palearctic species (doubtful in America). In Europe south as far as central Spain (FUE 1919, p. 123), Corsica (DEV 1935, p. 40), southern Italy (montane), Sardinia, Sicily (LUI 1929, p. 97), Greece (OTZ 1886, p. 209). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 310).  
469 Asia Minor (ECH 1922, p. 34; BOD 1927a, p. 50), Iran (BOD 1927c, p. 27). The Caucasus (CHD 1846, p. 172; SDR and LDR 1878, p. 78). Kirgizia and Turkmenia (HEY 1880–1881, p. 45). Siberia (among others, SBJ 1880, p. 42; RM!), east as far as Trans-Baikal (MDL 1931, p. 3) and Lena (PPP 1906b, p. 57). Whether the species *viridiaeneus* Beauv., *viridis* Say, *assimilis* Dej., etc., described from North America belong here, remains undecided (see Leng 1920, p. 70; CKI 1927–1933, p. 1135; JEA 1941–1942, p. 669). That the species may

have been displaced is, at any rate, quite possible.

### Ecology

Occurs on dry, sun exposed terrain, which is usually sandy or gravelly, but also on loamy as well as humus- or peat-mixed soil. Besides *latus*, this species is indeed the most eurytopic of all species of *Harpalus*. Highly heliophilous species, which also tolerates the dryness of almost barren sandy fields, but attains optimum population numbers on dry grassy and meadow soil with moderately dense and tall vegetation. It tolerates only weak shade, for instance, at forest fringes. It is strongly favored by culture, having found better conditions for existence as a result of deforestation and drainage of soil, and has a special predilection for cultivated land, especially for fallow land; also in the center of the city at building and ruderal sites, port installations, etc. In Central Europe also markedly eurytopic (see GRD 1937, p. 46).

### Biology

Southern Swedish catches: III: 7; IV: 32; V: 115; VI: 191; VII: 113; VIII: 68; IX: 30; X: 6. Immature beetles very numerous from June 25 (Upl) to August 16 (Vgl) and September 18 (Vbt). In Denmark numerous larvae observed from May to the end of August (LRS 1939, p. 340). Copulation observed on May 5, 1940 (Gtl). Hibernates as an adult. The beetle is polyphagous. One was seen running with an (unidentified) seed in its mouth (Små Ryssby, August 1, 1925, GTZ!), and in Central Europe it reportedly damages forest seeds (BUR 1939, p. 170). On the other hand it preys on ants (Austria; SZM 1907, p. 130) and in captivity preferred horse meat over vegetable nutrition (GRD 1937, p. 28).

### Dynamics

Wings fully developed and the beetle is prone to fly in sultry weather (Upl, May 27, 1943; Ögl, June 10, 1935; Hll, June 15, 1929; HST, E.N. 1876, p. 79; GAV 1897, p. 188; GRD 1937, p. 76; DTZ 1939, pp. 48, 49; HOR in litt.).

### Variation

Coloration remarkably variable. There is no reason at all to give a special name to the dark-legged form ("*confusus* Dej."). In all the color variations numerous intermediate blends occur. Also the form with extensive punctate patterns on the interstices of the elytra ("*semipunctatus* Dej.") can neither be taxonomically nor geographically differentiated.

## Fossil Records

Galcia, glacial (SCL 1916, p. 47). Germany, interglacial; identification very uncertain and dubious (Meunier 1901, p. 36).

*\*Harpalus anxius* Dft.

## Distribution

*Sweden*: Three subareas. I. Skå, mainly on the coast and adjacent parts of Hll and Ble. True inland records: Skå listorp (THS, 4 specimens, ML!); Södra-Sandby, numerous (several collectors!); Ringsjö region, 1873, 1882 (MLF, MG! MLC, HM!). Northernmost localities: Hll Skummeslöv, August 1941, 1 specimen (BRD!); Skå Hallands-Väderö, July 1937, 1 specimen (RNA, O.E., 1939, p. 176; ML!); Ivetofta, Valje, 1935 (LOH!); Fjälkinge, 1941 (Palm); Ble Lister, Hällevik (several collectors!). II. Öld and southern Gtl, north respectively as far as Öld Högby, 1920, 1 specimen (JNS 1922!) and Gtl Ljugarn (JNS!). III. Three isolated localities in central Sweden: Ögl Omberg, 1884, 3 specimens, from different places (MRT, MG! Strangely not found by Palm); Skänninge, June 1, 1929, 1 specimen (Palm, coll. LTH). Nke Vinön in Hjälmaren, May, 1906 (and later), 5 to 6 specimens (JNS, E.T. 1915, p. 204!).

Doubtful: Små (HGL, 1 specimen, without more precise labeling; coll. JNS!). Vgl (GYL 1827, p. 439); "Göteborg, MRT" (MG! Certainly erroneously labeled).

*Norway*: Absent.

*Finland*: Only in the southeast. Isthmus of Karelia (Ik) four localities, west as far as Muolaa (PFF! MER, MÅ!), found near Valkjärvi in larger numbers (several collectors! N.E. 1921, p. 114). Farther north two localities: K1 Parikkala, Ängilä, August 8, 1872 (SBJ 1873, p. 129; MH! MÅ!); Kb Kitee, 1940, 1 specimen (PME!).

471 Doubtful: Ta Padasjoki (EHN, 1 specimen, MÅ! See *Amara torrida*).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 27). Estonia, found only once near Dorpat (SDL 1872). Latvia (SDL 1872; ULN 1884); also in Lithuania (HEY 1903). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 352), also Ireland (JHS and HLB 1902, p. 569).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 133), southern Italy, Sardinia (LUI 1929, p. 101), Greece (OTZ 1886, p. 209). Northern Africa (BED 1895-1914, p. 137). Asia Minor (ECH 1922, p. 34). The Caucasus (CHD 1846, p. 184; SDR and LDR 1878, p. 81). Kirgizia (HEY 1896, p. 19). Siberia (among others, SBJ 1880, p. 46; RM!), east as far as Lena (PPP 1906b, p. 64).

## Ecology

Predominantly a xerophilous species, living mainly on sand containing some admixture of humus, on Öld also on gravelly Alvar† steppes. In Ögl and Nke also the localities seem to be more gravelly than sandy. Avoids barren soil and, to the contrary, prefers a more or less dense but not too tall xerophilous vegetation, where it lives especially among roots of grasses, *Artemisia campestris*, and similar plants. Also occurs on sandy fallow land as well as on overgrown dunes. Successive species in Skå, among others, *smaragdinus* and *neglectus*, on Öld usually *serripes*. Often gregarious. Also in the rest of Europe almost exclusively on sand (SDT 1861, p. 175; West 1940, p. 27; SRN 1926, p. 22; GRD 1937, p. 48; FWL 1887, p. 53; E.M.M. 1935, p. 66).

## Biology

Swedish catches: IV: 3; V: 10; VI: 37; VII: 23; VIII: 10; IX: 1. Immature beetles, July 3, August 8, September 15 (Skå). Maximum abundance in June even more pronounced in Denmark (LRS 1939, p. 342). Hibernates normally as an adult.

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

472

## \**Harpalus (Ophonus) azureus* Fbr.

### Distribution

*Sweden*: Found only on Öld and Gtl but widely distributed and locally almost abundant. In northern Öld, however, to date only one specimen has been caught, near Böda, Mellböda, July 8, 1943 (ERL!); otherwise north as far as Köping (LOH, SJB). On Gtl uniformly distributed, also on Fårön, 1901 (O. Lindbom!).

Doubtful: Små (STH, 1 specimen, MG!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark found only in three widely separated localities, respectively southern Jylland (E.M. 1937, p. 456), Møen, and on Bornholm (West 1940, p. 24). Doubtful in the Baltic States (only the old record "Livonia"; SDL 1872, 1891). According to OBT (1876) on the other hand, found in Leningrad region. British Isles (Joy 1932, p. 349).

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



*Total area:* Palearctic species. In Europe predominantly southern (for example, in northern Germany found singly and rare; HOR 1941, p. 210), south as far as central Spain (FUE 1919, p. 118), Corsica (DEV 1935, p. 39), southern Italy, Sardinia (LUI 1929, p. 95), Greece (OTZ 1886, p. 208). East as far as Ural (JAC 1905–1908, p. 375). Northern Africa (BED 1895–1914, p. 142). Asia Minor and Syria (RTT 1900, p. 66). Iran (SBR, C.C. 1927, p. 12). The Caucasus (SDR and LDR 1878, p. 76; LSH 1936, p. 140). Western and eastern Turkestan (SBR l.c.).

### Ecology

A xerophilous meadow species that lives on gravelly and usually slightly loamy limy soil with an admixture of humus. Vegetation rich but not too tall, and consists of *Anthriscus silvestris*, *Daucus*, *Galium verum*, *Inula salicina*, and similar plants; sometimes weak shade, for instance, of *Prunus spinosa*. Often on the fringe or even within the grass-rich of the Alvar† and preferably on the southern face of stone walls (limestone), characteristic for Öld and Gtl, where the beetle lives among the roots of plants or under large flat stones. Regular successive species: *Brachynus*, *Agonum dorsale*, *H. melleti*. It is highly probable that this species is dependent on limy soil, an observation made many times in the rest of Europe (SDT 1861, p. 162; West 1940, p. 25; WHF 1881, p. 31; HOR 1941, p. 210; JEA 1941–1942, p. 643; FWL 1887, p. 45). Like other species of *Ophonus*, it apparently often climbs onto the umbels of Umbelliferae (SDT l.c.; JEA l.c.).

### Biology

Swedish catches: V: 5; VI: 21; VII: 15; VIII: 14; IX: 2. In Denmark an even more pronounced spring insect (LRS 1939, p. 339), and immature beetles have been found at the beginning of August (West 1940, p. 25). Hibernation of adults recorded in Germany (Rapp 1933, p. 73). This might also be normal in our region, since immature beetles were collected on July 18, 1934 (Öld); strangely, one specimen was also collected there on June 15, 1934 (Gtl Sundre, LOH!). It thus appears that, exceptionally, larvae too may hibernate.

### Dynamics

Wing dimorphism evident, more correctly polymorphism, since at least in southern Europe intermediate forms are also found (BED, L'Abeille, 1898, p. 139; APF 1904, p. 184; JEA 1941–1942, p. 643). From Sweden I have only

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

seen fully winged specimens, and those in which the wings are stunted to a small triangular rudiment about one-third the length of an elytron. The macropterous form might be capable of flight; however, flight observations absent to date.

### Variation

The Swedish material appears to be homogeneous and variable only in color and wing structure (see above). On the other hand, the species is represented by a series of subspecies in southern Europe and the Near East which, however, are not sharply differentiated in most cases (SBR, C.C. 1927, pp. 10 ff.).

### \**Harpalus (Pardileus) calceatus* Dft.

#### Distribution

*Sweden*: Only in southern Skå continuously distributed and probably constantly native, north as far as Kävlinge (MCK 1835, p. 3; THS, 1 specimen, MB!); Södra-Sandby, 1853 (THS, ML! HM!); Skatteberga, September 5, 1943, 12 specimens (CHR); Ilstorp (THS, ML! HM! LU!); Degeberga, 1851 (BOH 1851, p. 61). For the rest of Sweden only solitary records exist, probably due to casual migration. Hll Halmstad (LTK, according to THS 1867a, p. 59). Öld (MJB, 1 specimen, coll. JNS!), Halltorp (BOH, according to manuscript in  
474 K.V. Ak.; "Öl," 1 specimen, RM!), September 1939, 1 specimen (BRC, RM!). Gtl Sandön, 2 specimens on the seashore (JNS 1925, p. 69!). Upl Runmarö, 1 immature specimen (HFS, LÖ!).

Doubtful: Små Jönköping, Råslätt (GAD, 2 specimens, LJ!). Vgl Göteborg (EKB, 2 specimens, MG! The labeling by EKB is not always reliable). Vbt (WBG, 1 specimen, RM!).

*Norway*: Only 1 specimen: 2 Leangen in Asker (HLS, according to SHY 1879, p. 21).

Erroneous: 4 Gjeving in Dypvåg (STE 1898; see N.E.T. 1921, p. 89).

*Finland*: Only four, probably accidental records on the southern coast. Nl Tvärminne, August 1934, 1 specimen (MKK, coll. CRP!); Snappertuna, Nothamn, July 1943, 1 specimen (NDM!); Tuusula, potato pit in sandy soil, August 26, 1940, 1 specimen (PME, S.H.A. 1940, p. 81!). Tytärsaari Island in the Gulf of Finland, on the southern seashore after gale winds, August 10, 1932, 2 specimens (HLL 1933, p. 127!).

*Russian sector*: Ko Nurmoila, 1942, 1 specimen (PFF!); Sv Uslanka, 1943 (PFF!).

*Adjacent regions*: In Denmark highly local, only on Bornholm somewhat more frequent, also in Jylland, on Falster and Sjaelland (West 1940, p. 25). Estonia, only on the northern coast. 1 specimen near Klooga, August 7, 1938 (MIL, according to HAB in litt.). Latvia, two localities on the coast (LCK and

MIK 1939; LCK in litt.). Leningrad region (OBT 1876). Absent on the British Isles.

*Total area:* Palearctic species. In Europe south as far as central Spain and the Balearic Islands (FUE 1919, p. 121), central Italy (LUI 1929, p. 96), Greece (OTZ 1904, p. 188). The Caucasus (CHD 1846, p. 178; SDR and LDR 1878, p. 77). Western Turkestan (HEY 1880–1881, p. 44). Siberia (among others, SBJ 1880, p. 42; RM! PPP 1907d, p. 9), east as far as Ussuri (SBR, C.C. 1930, p. 181). China (SBR l.c.).

### Ecology

Distinctly xerophilous species that lives on dry sandy fields with sparse but often very tall vegetation. Typical example: Skå Lilla-bedinge, Äspöholm, July 16–20, 1943; sandy fallow, two to three years old, with sparse vegetation of sand grasses, like *Artemisia campestris*, etc. The species was found in large numbers (31 specimens) under small stones, under *Artemisia*, as well as under stacks of dry *Triticum repens*. Successive species were, among others, *H. griseus* and *Amara fusca* which, however, were more rare, and also *A. spreta* (CHR). In the rest of Europe it is likewise a distinct sand animal (West 1940, p. 25; 475 Dahl 1928, p. 151; HOR 1941, p. 214). In addition to *H. griseus*, *Pterostichus lepidus* has also been mentioned as a successive species (E.B. 1934, p. 85).

### Biology

Swedish catches: V: 4; VI: 4; VII: 7; VIII: 12; IX: 3. In Denmark the maximum abundance in August is still more pronounced (LRS 1939, p. 340). The period of emergence seems to be very long; the following immature beetles were observed in Sweden: May 8 (3 specimens, THS, ML!); July 18 (7 specimens), July 19 (2 specimens), July 20 (several specimens), 1943 (CHR!); August 1853 (1 specimen, ML!). LRS (l.c., p. 414) is probably correct in his assumption of autumn breeding and hibernation in the larval stage, however, this certainly must take place at very diverse instars. According to observations in the rest of Europe the species is polyphagous, since it is known to partly damage seeds of millet and flax, and partly to prey on a species of *Cleonus* (larvae ?) (BUR 1939, p. 171).

### Dynamics

Wings fully developed and the insect is an exceptionally good flier; it has been caught at light in the southern countries, often in large numbers (see WHF 1881, p. 32; JNN 1905, p. 187; Dahl 1925, p. 75; GAV 1897, p. 188; LSH 1936, p. 140). Three beetles were caught in a greenhouse illuminated with neon light near Skå Alnarp (August 22, August 23, September 11, 1941; CHR), which



had to have flown there. The two specimens collected at Tytärsaari in the Gulf of Finland after a gale wind, have certainly drifted. In general, *calceatus* is considered a transmigrating species in our region, which is a permanent resident almost in southern Skå.

*\*Harpalus distinguendus* Dft.  
(*psittacinus* Fourc.)

Distribution

*Sweden:* Distribution shows little continuity. I. Southeast: In Skå widely distributed but to date not known from the southeastern part; northernmost localities: Ängelholm, 1937 (LBÅ); Bonarp (MLF, according to THS 1868, p. 293); Ignaberga, 1942, 2 specimens (BRK, ML!); Oppmannasjön and Ivö, 1941 (Palm!). Ble Hällevik, 1936 (JNS); Ronneby, around 1930 (LUG, coll. 476 LTH). Små Gårdsby (GTZ!); Kalmar, Förlösa (HGL, coll. JNS!); Långemåla, 1923 (BRD, coll. JNS! MU!). Strangely, found neither on Öld nor on Gtl. II. A belt across central Sweden. Delimiting localities: Vgl Råda, 1 specimen (NOT!); Hjo, 1936, 6 specimens (LTH); Brandstorp, 1943, 1 specimen (C. Thorén!); Ogl Skänninge (leg. ?, coll. JNS!); Motala region, 1933, 1935, several localities (LTH); Sdm Husby-Oppunda, 1942 (OLS); Upl Enköping, 1942, 2 specimens (B. Nyman!); Uppsala, not rare, at least since 1910 (many collectors!); Erken, 1941, 1 specimen (LTH); Norrtälje, 1936, 1 specimen (LTH); Häverö, Utsund, 1943, 1 specimen (H. Undén!). In the Stockholm region almost frequent. III. Between latitude 60° N, and 62° N, Vrm Ambjörby, 1933, 3 specimens (Palm and LTH 1937, p. 119!). Dlr Ludvika, 1 specimen (WSL!); Hedemora, 1935 (RGS, according to JNS); Stora-Tuna, Holmsjön, 1936 (KLF); Falun (TJB, coll. LTH). Hls Bollnäs, 1942 (ALM!); Ljusdal, 1938 (SJB); Delsbo region (RUD, 1 specimen, MG!); Ramsjö, June 23, 1943, 1 specimen (LDN).

Doubtful: Göteborg (MJB, 1 specimen, coll. JNS!).

*Norway:* Found only in the inland of the southeast, altogether seven localities, west as far as 3 Fiskum (N.E.T. 1923, p. 255; MO!) and 15 Krödsherad, Noresund (HLS 1891a, p. 13); north as far as 12 Ilseng (N.E.T., l.c.; MO!).

*Finland:* Only three widely separated localities: Ab Åbo, May 16, 1942, 1 specimen (LBG!). Sa Punkasalmi (N.E. 1927, p. 61; MH!). Ik Terijoki (HLM, according to KNG).

Erroneous: Kl Salmis (N.E. 1938, p. 127; S.H.A. 1940, p. 81; = abnormal specimen of *aeneus*!).

*Russian sector:* No records.

*Adjacent regions:* In Denmark only in the southern parts of Jylland and on the islands (including Bornholm), very rare (West 1940, p. 25). Estonia, only one definite locality: Petseri in the southeast (HAB; COL, coll. STK).



According to SDL 1872: "rare in Livonia"; 1891: "frequent in our region"). Leningrad region (OBT 1876). Absent on the British Isles.

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 124), Corsica (DEV 1935, p. 40), southern Italy, Sardinia, Sicily (LUI 1929, p. 97), Greece (OTZ 1886, p. 209). Northern Africa (BED 1895–1914, p. 133). Azores and Madeira (JEA 1941–1942, p. 669). Asia Minor (RTT 1900, p. 87). Syria (JEA l.c.). Iran (BOD 1927c, p. 27). The Caucasus (CHD 1846, p. 174; SDR and LDR 1878, p. 77). Turkmenia and Kirgizia (HEY 1896, p. 19). Western Turkestan (HEY 1880–1881, p. 45). Siberia (among others, SBJ 1880, p. 42; RM!), east as far as Lena (PPP 1906b, p. 57).

## Ecology

Occurs on dry sun exposed, preferably loam- or sand-mixed gravel with low sparse vegetation of grass or weeds. In our region (especially in central Sweden) almost always synanthropic, in or near cities and other larger villages, on building sites and lawns, running quite often on roads during sunshine; less often in gravel pits. Probably this xerophilous species was favored by heavy drainage of cultivated landscapes and does not essentially require anthropochorous dispersal. In the rest of Europe the species has not been mentioned as synanthropic, occurring instead in open sandy fields (West 1940, p. 25; SRN 1926, p. 20; Dahl 1928, p. 156). The only exception is a report from Silesia: "not found on sandy soil" (ROG 1856, p. 13); in our region also the species might not actually occur on pure sand.

## Biology

Swedish catches: IV: 11; V: 20; VI: 18; VII: 5; VIII: 4; IX: 3; X: 1. It is thus a very pronounced spring animal. An immature beetle was observed on July 26, 1940 (Skå Löddeköpinge, CHR). In our region this species is certainly a spring breeder that hibernates as an adult, as assumed by LRS (1939, p. 415). In Central Europe there are apparently two generations, and larvae as well as freshly emerged beetles hibernate (BUR 1939, p. 172). In France the beetle purportedly damages strawberries (BUR l.c.); in our region it was observed spontaneously consuming the eggs of slugs (NOT 1943, p. 34).

## Dynamics

Wings fully developed and the carabid is an unusually active flier during warm sunny weather, at least in spring. Observations on spontaneous flight: Stockholm, repeatedly (NOT 1943, p. 34); Upl Lovön, May 22, 1941 (BSS); Djursholm, May 16, 1942 (LTH); Uppsala, May 22, 1943 (LTH). In Central Europe flight has been recorded several times. In central Sweden the species seems to

have increased in numbers in recent decades.

*\*Harpalus frölichii* Sturm

Distribution

Sweden: Extremely rare, found only in Skå and southern Hll. Skå Ravlunda, 478 Haväng, June 11, 1925, 1 specimen (ARW, coll. LTH); Ilstorp (Roth, according to MLG 1863, p. 40); Södra-Sandby, May 1853, June 1861 (THS 1859, p. 282; 4 specimens, MB!). Additionally, 7 specimens from Skå without locality (THS, Roth, Erson; RM! MG! MB!), Hll (leg.?, MG!), "Södra Halland" (certainly Edenberga region; MRT, 1 specimen, MG!).

Erroneous: Öld and Gtl (LTH, E.T. 1924, p. 132, = *melancholicus*!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rather widely distributed, in Jylland as well as on the islands (including Bornholm) (West 1940, p. 27). Estonia and Latvia, one locality each (SDL 1872). Leningrad region (MAS 1903). British Isles, only England (Joy 1932, p. 353).

*Total area:* Palearctic species. In Europe predominantly eastern, south as far as eastern France (DEV 1935, p. 41), Austria (HOR 1941, p. 217). Transylvania (PTI 1912, p. 26). In Russia north as far as Yaroslav and Kazan (JAC 1905–1908, p. 381). The Caucasus (RTT 1900, p. 105; LSH 1936, p. 140). Western Turkestan (SBR, C.C. 1932, p. 174). Siberia (among others, SBJ 1880, p. 43; RM!), east as far as Trans-Baikal (MDL 1931, p. 4). Northern China (SBR l.c.).

Ecology

In Skå occurs on sandy fields (THS 1859, p. 282). Also in Central Europe always on dry sandy soil (West 1940, p. 28; BUR 1939, p. 172), and in dune regions at the sea (SRN 1926, p. 22; E.B. 1936, p. 20); sometimes together with *servus* (NBG 1933, p. 58). In the Berlin region purportedly "under bushes of *Salsola kali*" (Dahl 1928, p. 154).

Biology

There are only five dated Swedish specimens, all of which were collected in May and June. The rather rich Danish material has likewise been collected mainly in these two months, but a considerable number also in August–September. It might be correct to infer therefore (LRS 1939, pp. 341, 417) that the species is a spring breeder and hibernates as an adult.

## Dynamics

Wings fully developed. In the Caucasus flying beetles have been caught in large numbers at light (LSH 1936, p. 140).

479

*\*Harpalus fuliginosus* Dft.  
(*nigritarsis* auct. p.p.)

## Distribution

*Sweden*: Very unevenly distributed. Two subareas recognizable, however, possibly interconnected. I. Southern and central Sweden, especially in the west (for instance, it is apparently missing in southeastern Skå, GtI, and most parts of the eastern coastal region). Eastern delimiting localities: Skå Kämpinge (several collectors!); Ble Lister (according to JNS), 1935, 1 specimen (LOH!); Små Kalmar (WLN, according to GLL 1896, p. 29; in coll. WLN, LG, but no labeled specimen); Öster-Korsberga, Skarhult, 1929 (GTZ!); Öld Stora-Rör (ERC, 1 specimen, MG!); Ögl Ljung, Hjässa, June 28, 1942 (OSS, 1 specimen, ML!); Nke Laxå, August 1900 (RMN, 1 specimen, RM!); Vrm Likenäs and Ambjörby 1933 (Palm and LTH 1937, p. 119!); Dlr Mora, Kråkberg, June 21, 1937, 1 specimen (KLF!); Särna (AND, 1 specimen, LF!); Hls Färila, 1943, 1 specimen (Börjeson!); Ramsjö, June 25, 1943 (LDN); Mdp Paljacka, July 1937, 1 specimen (BRC, RM!). Isolated localities in the east: Stockholm, Haga (BSH, 1 specimen, MS!). Skanstull (MJB, E.T. 1901, p. 191; no voucher specimen); Upl Bennebol, 1 specimen (RGS!). II. In the Norrland forest region north of latitude 63° N. Delimiting localities: Åsl Dorotea and Vilhelmina, 1936, 1 specimen each (LTH); Vojmsjön, 1832, 1 specimen (ZTT 1840, p. 37); Lyl Sorsele, among other species, 5 specimens, August 13, 1931 (GTZ, E.T. 1932, p. 51!); Pil Arjeplog, Loholm (PRS, 1 specimen, ML!); Lul Jockmock, 1843 (BOH, manuscript in K.V. Ak.), 1924, several specimens (LTH); Tol Jukkusjärvi, 2 specimens (ZTT 1828, p. 26); Kiruna, August 9, 1932, 1 specimen (BRD, coll. LTH); Laimolahti at the Torneträsk, 1 specimen (BRD 1931, p. 10; 1934, p. 226).

*Norway*: In the southeast widely but sparsely distributed, chiefly in the inner valleys, north as far as 22 Bjöberg (STE, MB!); 14 Bergset in Öystre-Slidre; 12 Hamar. On the western coast only two localities: 6 Jæren, Sola (HLS 1915, p. 31); Gloppen in Nord Fjord (N.E.T. 1930 p. 338).

*Finland*: Only scattered localities, which probably form two separate areas. I. In the south (especially southwest) several localities, north as far as St. Ytterö (ELF); Tb Pihlajavesi (SAA!); Saarijärvi, Pyhähäkki, 1943 (KRG); east as far as Ta Heinola (SBJ 1873, p. 129). Farther, two localities in the Isthmus of Karelia: Ik Muolaa (PFF); Metsäpirtti (KRG! LBG!). II. North of latitude  
480 65° N: Ok Ruhtinassalmi (SSK, several collectors!). Ks Kuusamo (SBJ 1873, p. 129); Salla (several collectors!). Lk Sodankylä (HLL!); Muonio (MKL, MH!



RNK); Pallastunturi (RNK). Li Ivalo, 1939, 1 specimen (KRV!).

*Russian sector:* Two localities in the eastern part of Kola Peninsula (PPP 1905, p. 97; MH!). In southern Karelia near Ko Nurmoila, 1942 (PFF!).

*Adjacent regions:* In Denmark rather widely distributed (including Bornholm) but rather rare, in Jylland found only in the northern half (West 1940, p. 26). Estonia, only near Dorpat (SUM 1931). Not known from the Leningrad region to the best of my knowledge. Absent on the British Isles.

*Total area:* Palearctic species. In Europe predominantly southern, south (montane) as far as southeastern France (DEV 1935, p. 41), central Italy (LUI 1929, p. 99), Montenegro (APF 1904, p. 195). The Caucasus (SDR and LDR 1878, p. 78; ECH 1930b, p. 271). Siberia, east as far as Kamchatka (HEY 1880–1881, p. 45). Japan (according to CKI 1927–1933, p. 1154).

### Ecology

A xerophilous, species that often lives in the south on sandy soil by the sea, farther north on sandy, often very stony moraine. Tolerates only poor shade, and hence occurs usually in quite open situations or, at the most, at forest fringes. Sometimes in sand pits. Vegetation always patchy and usually dominated by *Calluna*, often also by *Cladonia* and other lichens. Successive species are pretty often *Miscodera* and *Cymindis vaporariorum*. The carabid often remains somewhat buried in the sand, preferably under *Calluna* tufts. Only on the Kola Peninsula does it cross the timber line (PPP 1905, p. 97; 1910a, p. 316). In Central Europe likewise found on sandy soil, but more often than in our region at places at least sparsely wooded with pine (LRS 1939, p. 416; LTZ 1885–1892, p. 25; E.M.D. 1919, p. 164; NBG 1933, p. 58; GRD 1937, p. 46). The record from Silesia of its recovery together with *Bembidion humerale* (W.E.Z. 1927, p. 6) is strange.

### Biology

Southern Swedish catches: III: 1; IV: 0; V: 8; VI: 12; VII: 6; VIII: 10; IX: 1. In Denmark, strangely, most of the specimens have been collected in July, from which LRS (1939, pp. 341, 416) concludes that the species breeds in autumn and hibernates in the larval stage. In our region copulation was observed in June (Tol; ZTT 1828, p. 26) and an immature beetle on August 13, 1931 (Lyl Sorsele, GTZ!), and I am convinced that here hibernation as an adult is normal. Monthly records from Central Europe (Rapp 1933, p. 78; BUR 1939, p. 172) convey the same impression.



## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

## Variation

The rare, pale, red-legged form ("*germanicus* Reitt.") occurs in Sweden markedly only north as far as Små and Vgl, with intermediate forms occurring at least as far as Vrm. Farther north the femora seem to be constantly darker.

*\*Harpalus (Pseudophonus) griseus* Panz.

## Distribution

*Sweden*: Predominantly a southern species, and a permanent resident, at most, only in southwestern Skå, although there are only five records from there in the present century. Delimiting localities northeast here: Farhult (WLG, 1 specimen, MM!); Stehag, 1890 (MLC, 2 specimens, coll. WLN. LG!); Ilstorp, several specimens (THS, ML! MB! LU!); Nybro, August 13, 1936, 3 specimens (Palm!); Löderup, May 24, 1943, 1 specimen (CHR). Ble Hällevik, July 15, 1939, 1 specimen (KMN, ML!); Rödeby, July 28, 1943, 2 specimens (SDH!); Små Gårdsby, September 3, 1923, 1 specimen (BRD!). Öld (BOH, 1 specimen, RM!). Gtl Lau, Gannor, August 10, 1942, 1 specimen (WSJ, coll. LTH).

Erroneous: Öld and Gtl (LTH, E.T., 1924, p. 132, = small specimen of *pubescens*!). Vgl Göteborg (EKB, 1 specimen MG! see *Amara alpina*).

*Norway*: Only two localities in the southeast, one specimen each, and certainly accidental: 2 Asker (HLS, SHY 1879, p. 21; MO!); Ringerike (WRL, MO!).

Doubtful: 4 Grimstad (ULL, E.T. 1899, p. 296; accepted neither by MST nor in the Catalogus, 1939).

*Finland*: Only on two islands in the Gulf of Finland: Tytärsaari, August 11, 1932, 1 specimen (HLL 1933, p. 127; MH!); Seiskari, July 9, 1936, 1 specimen (THG!).

Doubtful: "Åbo-län" (MNH, according to SBJ, 1873, p. 127; no voucher specimen). Older records from Finland, according to HLL (1921b, p. 83), have been confused with *pubescens*.

482 *Russian sector*: Ko Nurmoila, 1942, 1 specimen (PFF!). Sv Uslanka, 1943, 1 specimen (PFF!).

*Adjacent regions*: In Denmark found only on the islands (including Bornholm) and rather rare (West 1940, p. 25). Estonia, three localities, including 1 specimen near Klooga on the northern coast, August 7, 1938 (MIL, according to HAB; LCK in litt.; COL, coll. STK). Latvia (SDL 1872; ULN 1884; LCK in litt.). Leningrad region (OBT 1876). Absent on the British Isles.

*Total area:* Palearctic species. In Europe south as far as southern Spain and the Balearic Islands (FUE 1919, p. 121), Corsica (DEV 1935, p. 40), southern Italy, Sardinia, Sicily, Malta (LUI 1929, p. 96), Greece, and Crete (OTZ 1886, p. 209). Northern Africa (BED 1895–1914, p. 145). Asia Minor (ECH 1922, p. 34). Iran (BOD 1927c, p. 79). The Caucasus (SDR and LDR 1878, p. 77; LSH 1936, p. 140). Western Turkestan (HEY 1880–1881, p. 43). Siberia (among others, SBJ 1880, p. 41), east as far as Lena (PPP 1906b, p. 57). Amur (HEY l.c.) and Ussuri (MDL 1931, p. 4). China (according to CKI 1927–1933, p. 116). Japan (JEA 1941–1942, p. 654).

### Ecology

In its mode of life this species completely corresponds with *calceatus* with which it occurs almost regularly together (E.B. 1934, p. 84), both in our region (e.g., Skå Lilla-Bedinge, July 1943; see description of biotope under *calceatus*) as well as in Central Europe. It therefore does not live with the related species *pubescens* on more or less loamy soil, but on purely sandy (or sandy-gravelly), markedly dry soil with sparser xerophilous vegetation, preferably on fallow land. In Central Europe also a pronounced sand animal (SDT 1861, p. 167; West 1940, p. 25; GRD 1937, p. 46; DTZ 1939, p. 46; HOR 1941, p. 214).

### Biology

The dated Swedish catches are distributed as follows: V: 11; VI: 2; VII: 12; VIII: 12; IX: 17; X: 0; XI: 11. The sharp decline in June is likewise marked in Denmark (LRS 1939, p. 340). Numerous quite immature beetles were collected on July 17 to July 20, 1943 (Skå Lilla-Bedinge, CHR!). LRS (l.c., p. 414) is probably correct in assuming autumn breeding in this species, but in addition to the larvae, a not inconsiderable number of adults also hibernate. In Central Europe larval hibernation has also been assumed (BLK 1925, p. 25; BUR 483 1939, p. 172). The beetle is at least partly a seed eater (GRD 1937, p. 27), while the larva feeds on larvae of beetles (BLK l.c.; BUR l.c.).

### Dynamics

Wings fully developed and the species is an unusually good flier. From our region only one definite flight observation (Skå Nybro, August 13, 1936, at night, 3 males flying to light, Palm!). On the other hand, numerous records have been published from the rest of Europe as well as from the Caucasus, according to which the species often flies to light in large numbers. In general, it is a species with a strong tendency toward vagrancy, and the Fennoscandian records are no doubt strayed specimens (at least north of Skå).

\**Harpalus hirtipes* Panz.

Distribution

*Sweden:* In Skå there are many localities, only one of which lies on the actual southern coast. Northernmost localities: Saxtorp, 1922, 1 specimen (ADR!); Hör, Sjöbergasjön, 1937, 1 specimen (KMN, ML!); Nosaby, 1905 (ROS, 1 specimen, ML!); Trolle-Ljungby, Vanneberga (GAD, 1 specimen, LJ!). Ble Lister, Hällevik (several collectors!). Hll Harplinge, 1942, 1 specimen (FRQ!); Falkenberg, mouth of Suseån, 1935, 1 specimen (Palm); Varberg, 1907, dead specimens at the sea (NST). Öld Stora-Rör region (several collectors!). Gtl Vamlingbo (according to BOH 1849, p. 200, 1 specimen, RM!).

Doubtful: Små (according to GYL 1810, p. 123; THS 1859, p. 281), "Småland" (without locality data; HGL, 2 specimens, coll. JNS!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rather widely distributed, also on Bornholm, but in Jylland only in the east (West 1940, p. 28). Estonia, only 1 old specimen from Dorpat (HAB in litt.). Latvia, three localities (MIK 1905; LCK and MIK 1939; LCK in litt.). Leningrad region (MAS 1902; BSK 1922, 1925). Absent on the British Isles.

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 41). Northern Italy (LUI 1929, p. 101). Transylvania (PTI 1912, p. 27). The Caucasus (JAC 1905–1908, p. 381). Siberia (HEY 1880–1881, p. 46; PPP 1907d, p. 11), and in the east (RTT 1900, p. 109). Central Asia (SBR, C.C. 1932, p. 168).

Ecology

Predominantly a xerophilous sand animal that lives on loose, more or less barren sand, and during the day is usually burrowed somewhat under the surface or hides under plants such as *Calluna* and *Artemisia campestris*, or under stacks of grass, etc. Occurs often in the vicinity of the sea but not in the actual quicksand region. In the rest of Europe also a true sand animal (S.E.Z. 1852, p. 167; NBG 1933, p. 57); in Denmark found at roots of grass together with the form *silvicola* of *Amara quenseli* (HSN, F.F. 1924, p. 35).

Biology

Distribution of the dated Swedish specimens: IV: 1; V: 13; VI: 27; VII: 12; VIII: 14; IX: 3. Immature beetles (Skå), July 19, July 20 and September 5, but also 2 females, May 9, 1943 (Lomma, CHR). The maximum abundance of adults in Denmark is likewise in June, from which LRS (1939, pp. 342, 417) concludes that breeding occurs in spring and hibernation in the adult stage.



This might be normal in our region also, but since two immature beetles were found in May, larvae may exceptionally hibernate too.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

\**Harpalus latus* L.  
(*fulvipes* Fbr., *limbatus* Dft.)

### Distribution

*Sweden:* Except for the fjelds and the northern parts of Lapland, distributed uninterruptedly throughout the country and occurs everywhere. Northernmost or highest localities are: Dlr Särna (several collectors!); Hjd Hede, 1936, 1 specimen (BRK); Jtl Ånn, 1934, numerous (LTH); Åre (several collectors! already found in 1840 by ZTT, ML!); Strömsund, 1932 (Palm); Ång Tåsjö (CDG, E.T. 1931, p. 164!); Åsl Dorotea, 1936 (LTH); Vilhelmina, 1936 (LTH), 1939 (NST!); Lyl Storuman, 1936, numerous (LTH); Sorsel, three localities (GTZ, E.T. 1932, p. 50!); Lul Pållem, 1940, 1941, 1 specimen each (LTH, WRN!); Nbt Edeforsen and Harads, 1938, frequent (LTH); Narken; Tärendö; Pajala, Erkheikki, 1938 (LTH); Pajala village, 1938 (JNS, LTH). Isolated and  
485 probably accidental record: Tol Björkliden, August 17, 1927, female "nuper" (BRD 1931, p. 10; 1934, p. 227; RM!).

*Norway:* In the south occurs everywhere except in the fjelds, and farther north probably uninterruptedly distributed at least as far as latitude 67° N, 32 Saltdal (LYS). Even farther north only three widely separated localities recorded, of which some do not seem very reliable: 35 Tromsø (SNR 1862, p. 329); 36 Nordreisa (STE, MB!); 38 Bossekop in Alta (SNR l.c.). STA (in litt.) considers only the locality Nordreisa unimpeachable; the solitary record near Tromsø and in Alta, where meticulous surveys were made later, appears quite improbable. Confusion with *4-punctatus* possible.

Erroneous: 33 Lavangsfjeld (MKL 1881, p. 12, = *4-punctatus*, SPS 1888-1889, p. 116).

*Finland:* As far as about latitude 67° N distributed universally and very frequent. Northernmost localities: Lk Muonio (SBJ 1873, p. 128; STN!); Kittilä (several collectors!); Li Ivalo, 2 specimens (LBG!), 1 specimen (PFF!); Lp Pummanki, dwarfed female (LNN, MÅ!), July 10, 1939, dwarfed male (KRV!).

*Russian sector:* Two localities in the eastern part of Kola Peninsula: Lv Kusomen (PPP 1905, p. 97); Lj Ponoj (PPP l.c.; MH!). In southern Karelia widely distributed, north as far as Kr Suma (LEV, MH!).

*Adjacent regions:* In Denmark occurs everywhere and frequent (West 1940, p. 26). Estonia, including Ösel (HAB 1936a) and Latvia, widely distributed; the



report by SDL (1872, 1891) "very rare in our region" is quite incorrect (ULN 1884; MIK 1905, 1911; LCK and MIK 1939; SAA! HAB in litt.). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 351), also Ireland (JHS and HLB 1902, p. 568). Shetland (West 1930, p. 75). Iceland (LTH 1931, p. 178).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 128), central Italy (LUI 1929, p. 99), Yugoslavia (APF 1904, p. 194), Transylvania (PTI 1912, p. 26). In the northeast as far as Mezen (PPP 1908, p. 5). The Caucasus (SDR and LDR 1878, p. 78). Western Turkestan (HEY 1893, p. 25). Western Siberia (among others, SBJ 1880, p. 42; RM!).

### Ecology

486 Like *aeneus*, an eurytopic species. However, it tolerates more shade and hence occurs more often in sparser forest stands, for instance, together with *4-punctatus*. Nevertheless it is found predominantly in more open terrain with (preferably tall) grassy or meadow vegetation and occurs on almost every kind of soil (sand, gravel, loam, humus, peat); it seems to prefer loam- or humus-mixed gravel. Its requirement for humidity is somewhat greater than that of *aeneus*, and for this reason it does not follow the latter into the driest and most barren biotopes. It is not so highly favored by culture as *aeneus*, but in no way avoids cultivated land and, especially in the north, deforestation has provided better living conditions for it. In the north the species reaches the fjelds only exceptionally and, as far as I know, only one specimen has been collected in the Scandinavian *reg. bet.* (Tol Björkliden). The occurrence near Lj Ponoj in the tundra region (see above) is probably explained by passive dispersal. In Central Europe a markedly eurytopic species as well (see GRD 1937, p. 46).

### Biology

Southern Swedish catches: II: 1; III: 5; IV: 25; V: 132; VI: 225; VII: 134; VIII: 61; IX: 15; X: 4; XI: 1; XII: 1. In Denmark larvae found every month from February to September, but most in May. Hence LRS (pp. 341, 416) considers the species an "unstable autumn animal" that hibernates predominantly in the larval stage. Immature beetles found in Sweden: May 5 (Sdm), June 30 (Gtl), July 7, July 12, July 14, July 18, July 20, July 24 (twice), July 25, July 26, July 27, July 28, July 30, August 8, August 17, September 3 (Gtl). Periods of breeding and development might not be sharply differentiated therefore.

### Dynamics

Wings fully developed but comparatively smaller and with a weaker apical part than in *winkleri*, *4-punctatus*, *smaragdinus*, and other species. At any rate, the

insect is not a good flier. There is only one flight observation: Ob Rovaniemi, June 28, 1940 (KNG!). Near Upl Djursholm, Ösbysjön, I found one male on July 31, 1942 in the outer part of a wet quaking land, which could only have reached there by flight; in Finland, 15 specimens have been found in sea drift (Frey 1937, p. 436; PME 1944, p. 38).

*\*Harpalus luteicornis* Dft., Schaub.

Distribution

Due to earlier confusion with *winkleri* the distribution of this species is still  
487 not completely known for our region. Older records, for which examination of voucher specimens was not possible, had to be ignored.

*Sweden:* To date definitely established only from Skå and Göteborg region. Skå Stehag, 1882–1896, several specimens (leg.?. MU! MLC, MCH, and other collectors; coll. Roth, ML!). Hll Släp, numerous (SDN and other collectors; MG! RM! VA! and various private collections). Vgl Askim, May 31, 1935, 1 specimen (Palm, coll. LTH). “Skärgård of Göteborg” (probably Boh Öckerö; SDN, 1 specimen, MG!).

Doubtful: Vst Västerås, Stallhagen, May 13, 1908 (SLL, 1 specimen, RM!). Since SLL collected the species during the same year near Släp (RM!) an error in labeling may have occurred.

*Norway:* To date established only from Province 2: Oslo (ESM, CTT, SHY: MO!), Bygdøy (MST, MO!), Vestre-Aker and Hvalstad (STA!); Drammen (CTT, MO!); Ringerike (WRG, MO!).

*Finland:* Likewise found only in the south, continuously distributed along the coast, west as far as Nl Tvärminne (2 specimens, LBG!). Only in the east extends somewhat farther inland; northernmost localities: Ta Tammela (SAA!); Sa Kristina (SUH!); St. Michel (EHN, MH!); Kl Saari (PHJ!); Sor-davala (LNN, MÅ!).

*Russian sector:* Only in the extreme south (Sv): Kuujärvi 1942 (KNG!), 1943 (PFF!); Vaaseni, 1942 (KRV! Also according to PPP 1899a, p. 18); Us-lanka, 1943 (PFF!); Gumbaritsa, 1943 (PFF!).

*Adjacent regions:* Earlier records from Denmark based on *winkleri* (HSN and LRS 1941, pp. 199–200); however, the true *luteicornis* should hardly be missing here. Older records from the Baltic States and the Leningrad region could not be verified; the species was, however, found during 1943 near Lem-paala on the Russian side of the Isthmus of Karelia (PHJ in litt.). British Isles (according to JEA 1941–1942, p. 677).

*Total area:* Because of the earlier confusion with *winkleri* and *progre-diens* Schaub., the total distribution of the species is very incompletely known. So far *luteicornis* appears to be definitely known only from Europe, south as far as southern France (DEV 1935, p. 41; JEA 1941–1942, p. 677) and Italy (PTA 1934, p. 86); east at least as far as Slovakia (ROU 1930, p. 154). Records

from the Caucasus and Siberia, as recently mentioned by MÜL (C.C. 1931, p. 62), presumably based on older literature and require verification. At any rate the record published by SBJ (1880, p. 42) from western Siberia concerns *winkleri*, and the one specimen from Ural (Sverdlovsk, EHN, MH!) belongs to *progreiens* Schaub.

488

### Ecology

Due to the general confusion of this species with *winkleri* the mode of life of the true *luteicornis* is almost unknown. However, it seems to inhabit the same biotopes, i.e. more or less overgrown (probably usually wooded) gravelly soil, and the two species have been found together in Finland as well as in Russian Karelia. In Central Europe found purportedly in forests as well as meadows (Rapp 1933, p. 79).

### Biology

The eight dated Swedish specimens were caught from May to August, most of them (six) in May–June. In Thuringia also seems to be a pronounced spring species (Rapp 1933, p. 79). One may assume that (like *winkleri*) it is a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed and certainly functional. There are no observations on flight, but two specimens were collected in sea drift in Finland (Frey 1937, p. 436; PME 1944, p. 38!).

### Fossil Record ?

Galicia, glacial (SCL 1916, p. 47). Obviously, identification quite unreliable.

*Harpalus marginellus* Dej.: This species was reported from Finland (Al; STN, N.E. 1923, p. 90). The voucher specimen belongs to *rubripes* (HLL, N.E. 1934, p. 57; MH!).

### \**Harpalus melancholicus* Dej.

#### Distribution

*Sweden*: Very rare and found only in southern and eastern Skå, and on Öld and Göl. Skå Skanör (THS, 2 specimens, MB!); Kämpinge, May 1866 (THS 1867a, p. 61; 1867b, p. 40); Lilla-Bedings, Äspöholm, July 19, 1943, 1 specimen (CHR); Ystad, August 11 (leg. ?, MM!); Degeberga, June 1866 (THS l.c.; 4



specimens, MB!); Knäbäck, June 22, 1931, 1 specimen (Palm!); Åhus, August 1908 (ROS, 2 specimens, ML!), August 3, 1917, 1 specimen (WGR!). Old (MRT, 2 specimens, SDN, 1 specimen, MG!); Runsten, May 11, 1937, 2 specimens (Palm!); Råpplinge, Greby-Alvar†, 1921, 1 specimen (LTH); Borgholm  
 489 (BOH, manuscript in K.V. Ak.); Köping Ramsåtra (SJB); Högbý, July 1921, 2 specimens (LTH), July 1939, 1 specimen (JNS); Byerum, June 5, 1943, 2 specimens (BRK!). Gtl (ZTT, according to THS, 1859, p. 282; BOH, 2 specimens, RM! Timm, 1 specimens, VA!), Vamlingbo, July 1923, 1 specimen (LTH); Lau, 1923, 1 specimen (LTH); Ljugarn, August 6, 1942, 1 specimen (WSJ, coll. LTH); Lickershamn, July 18, 1934, 4 specimens (LOH!).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark likewise very rare and found only on the eastern islands, including Bornholm (West 1940, p. 26). Not known throughout the eastern Baltic Sea region. British Isles (Joy 1932, p. 352), also Ireland (JHS and HLB 1902, p. 568).

*Total area:* Western Palearctic species. In Europe predominantly western, south as far as southern Spain and Portugal (FUE 1919, p. 132), Corsica (JEA 1941–1942, p. 673), southern Italy (LUI 1929, p. 98; JEA l.c.), Greece (OTZ 1886, p. 209). East as far as Slovakia (ROU 1930, p. 153) and southern Russia (RTT 1900, p. 111; JAC 1905–1908, p. 382). Northern Africa (BED 1895–1914, p. 135). Asia Minor (APF 1904, p. 196). Iran (according to HOR 1941, p. 228). The Caucasus (CHD 1846, p. 181; SDR and LDR 1878, p. 79).

### Ecology

Predominantly a xerophilous species inhabiting sand, and living only in the vicinity of the sea within our region. The species does not occur on very barren quicksand however, but only at places where at least sparse grass growth of *Artemisia campestris*, *Carex arenaria* and similar plants occurs. Also in Central Europe found exclusively on sandy soil, among others on beach dunes (HOR 1941, p. 228; JEA 1941–1942, p. 673), seldom inland (B.E.Z. 1872, p. 155; D.E.Z. 1907, p. 155; JEA l.c.). Several times found burrowed under roots of plants such as *Corynephorus* (LTZ 1885–1892, p. 25), *Elymus* (HOR l.c.), and *Artemisia* (SDT 1861, p. 180); in the latter case together with *neglectus* and the form *silvicola* of *Amara quenseli*.

### Biology

Distribution of the few dated Swedish specimens: V: 3; VI: 8; VII: 12; VIII: 5. Immature beetles, May 11 (Öld, 2 specimens), July 18 (Gtl, 3 specimens). From

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



the distribution of only 12 Danish specimens, LRS (1939, pp. 342, 417) concludes that the species is a spring breeder, hibernating as an adult. At least in our region, however, hibernation in the larval stage might be considered normal.

Wings fully developed and certainly functional. Flight observations absent however.

*\*Harpalus (Ophonus) melleti* Heer  
(*rectangulus* Thoms.)

#### Distribution

*Sweden:* Found only in the southeast. Skå, in the southwestern half, with the following delimiting localities: Kullen, July 1936, 3 specimens (Palm!); Stehag, 1888 (MLC, HM!), 1889 (Roth, coll. WLN, LG!); Nybro, August 13, 1936, 1 specimen (Palm!). Små Kalmar (HGL, coll. JNS! WLN, LG!). Öld, several localities between Ottenby (1938, WRN!) and Högby, Binnerbäck, August 5, 1932 (GTZ!). Gtl, widely distributed, north as far as Irevik, May 29, 1940, 1 specimen (LTH).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark known to date from southeastern Jylland as well as the islands, including Bornholm (also in coll. LTH) (West 1940, p. 24). Not known throughout the eastern Baltic Sea region. British isles (Joy 1932, p. 350; LTH 1935d, p. 32).

*Total area:* To date known only from Europe but widely distributed. South as far as southern France (DEV 1935, p. 39), central Spain (WGN, C.C. 1926, p. 106), northern Italy (LUI 1929, p. 95), Croatia, Greece, Rumania (SBR, C.C. 1926, p. 170). East as far as Poland (TEN 1938, p. 415) and Crimea (SBR l.c.). In the south represented mainly by different subspecies.

#### Ecology

In its mode of life the species is similar first of all to *azureus*, with which it often occurs together on Öld and Gtl. Hence found on gravelly limy soil with some admixture of humus and more or less xerophilous meadow vegetation, even on the grass-rich parts of the Alvar†. At most, weak shade from bushes available. A requirement for limestone is possible. In northern Germany found on moraine soil, together with *puncticeps* (NBG, E.B. 1936, p. 270). In France, observed on umbels of *Daucus* (JEA 1941–1942, p. 652).

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

## Biology

Distribution of Swedish specimens: III: 1; IV: 0; V: 28; VI: 28; VII: 16; VIII: 13;  
 491 IX: 1. Immature beetle, September 16, 1928 (Gtl). In Denmark maximum abundance in July, but immature beetles observed at the end of July and the beginning of August, so that LRS's assumption (1939, pp. 339, 412) that the species breeds in autumn cannot be asserted with confidence. At least in our region hibernation in the adult stage might be normal.

## Dynamics

Wings fully developed. Spontaneous flight of one male to light observed, August 13, 1936 (Skå Nybro, Palm!).

\**Harpalus neglectus* Dej.

## Distribution

*Sweden*: Found only in the south, mainly on the coast; inland records only in Skå: Kävlinge, 1882 (Roth, 2 specimens, ML!); Södra-Sandby, 1882 (Roth, 1 specimen, ML!); Sjöbo, 1886 (Roth, 2 specimens, ML!); Ilstorp, numerous (THS, ML! MB! Roth, HM!). Northernmost localities: on the western coast—Skå Torekov, 1932 (BLL, coll. ARV!); Hll Skottorp (BOH 1863, p. 64); Falkenberg (ERC, MG! WIB, ML! RGS!). On the eastern coast: Ble Hällevik, 1936 (SJB), 1937 (BUT, coll. LTH); Ronneby region (ERC, coll. WRN); Kristianopel, Fågelmara, July 26, 1930 (GTZ!). Öld (SDN, ERC, MG! FHR, AHT, VA!). Stora-Rör (several collectors!); Högby, August 5, 1932 (GTZ!).

Erroneous: Öld Greby; Gtl Vamlingbo (LTH, E.T. 1924, p. 132, = *anxius*!). Nke Hammar (WNG, E.T. 1880, p. 192; according to JNS, = *tardus*).

Absent in the rest of Fennoscandia. The record from Norway must be rejected (MST, N.E.T. 1921, p. 99; 1933, p. 270).

*Adjacent regions*: In Denmark found both in eastern Jylland and on the islands, including Bornholm (West 1940, p. 27), northernmost on Læsø in the Kattegatt (FDL 1935, p. 131). Absent throughout the eastern Baltic Sea region. British Isles (Joy 1932, p. 352), also Ireland (JHS and HLB 1902, p. 569).

*Total area*: Western Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 131), central Italy (LUI 1929, p. 100), Transylvania (PTI 1912, p. 26). East as far as Ural (JAC 1905–1908, p. 381). Northern Africa (BED 1895–1914, p. 136). The Caucasus (according to CKI 1927–1933, p. 1164). The records from Siberia (HEY 1880–1881, p. 46) are doubtful according to JAC (l.c.).

Predominantly a xerophilous sand species that lives especially in the coastal quicksand and dune regions. Always found in open dry places with loose sand where vegetation is poorly developed; usually rather deeply burrowed among roots of plants (such as *Cornyphorus*). In the rest of Europe likewise always predominantly a sand and dune animal (see NBG 1933, p. 57), with rare occurrences inland (B.E.Z. 1872, p. 155; HOR 1941, p. 226; JEA 1941–1942, p. 679).

### Biology

Distribution of dated Swedish specimens: V: 4; VI: 18; VII: 18; VIII: 23; IX: 13. In Denmark a pronounced maximum abundance in June (LRS 1939, p. 341). Occurrence of numerous immature beetles in August (August 8, and August 28, Skå). LRS (l.c., p. 417) indicates spring breeding and hibernation as an adult, which is certainly the case in our region also.

### Dynamics

Wing dimorphism evident. In brachypterous specimens the wing is reduced to a very small rudiment that is barely visible to the naked eye. The macropterous form has fully developed wings and is certainly capable of flight. However, no flight observations available to date.

### *Harpalus nigratarsis* C.R. Sahlb.

#### Distribution

*Sweden*: Only a single old specimen, “Lapponia borealis,” without more precise locality data (BOH, male, RM!); probably originated from Lul.

Erroneous: Tol Abisko (JNS, E.T. 1914, p. 103; no voucher specimen).

*Norway*: No records.

*Finland*: The species was described (SBC 1834, p. 237) from “Lapponia” (certainly = Finnish Lapland). The precise locality is not known and there are no more recent records. In MH (!) there are two males labeled “Lapponia, Sahlberg” (in this connection, see LTH 1943a, p. 26); in MÅ (!) there are four specimens without locality (three males, one female) labeled “coll. Sahlberg,” in addition to one male labeled “individ. typicum”.

493 *Russian sector*: Doubtful. PPP (1905, p. 97) mentions Lj Ponoj (ENW). When I examined the voucher specimen in MH in 1935, I attributed it to *latus* because I was not certain at that time about the independent specific status of *nigratarsis*. Later, the specimen could not be traced again in the collection.

*Adjacent regions*: Absent.

*Total area:* Palearctic species. Outside the region known only from Siberia (RTT 1900, p. 99). My efforts to obtain a Siberian specimen for examination have been frustrated to date. However, according to the description given by RTT (l.c.), the identification might be correct.

#### Ecology, Biology

The mode of life, periods of development, etc. are totally unknown for this species.

#### Dynamics

Wings fully developed and certainly functional.

*\*Harpalus picipennis* Dft.  
(nec Thoms., *multisetosus* Thoms.)

#### Distribution

*Sweden:* Far rarer than the closely related species *vernalis*, with which it was confused earlier. Found only in Skå and on Öld. Skå Sjöbo, May 1887, (Roth, 4 specimens, ML!); Ilstrop (THS), July 15, July 17 (ML!), July 16 (2 specimens, MB!); Sandhammaren, June 1931 (Palm!), Kåseberga (Palm!), June 19, 1942 (CHR!), Löderup, July 1942 (CHR!); Vitaby, July 14, 1936, 1 specimen (SJB!); Degeberga (THS, 1 specimen, ML! leg.?, 1 specimen, MG!); "Ö. Lj." (certainly = Östra-Ljungby; THS, 1 specimen, MB!). Öld (THS 1869–1895, p. 1030), Stora-Rör region (SDN, 3 specimens, MG!, 2 specimens, coll. LTH).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark likewise confused earlier with *vernalis* and to date established only from two localities in northern Sjaëlland (West 1940, p. 28). Not known from the other adjacent regions ("*picipennis*" in England probably = *vernalis*).

*Total area:* Probably a Western Palearctic species. Its distribution is not completely known. In Europe south at least as far as central France (DEV 1935, p. 42) and Austria (HOR 1941, p. 229); east as far as Poland (SBR, 494 C.C. 1928, p. 82) and Slovakia (ROU 1930, p. 157). Western Turkestan (HEY 1893, p. 25, "*multisetosus* Thms."); uncertain record.

#### Ecology

A xerophilous sand species. Its mode of life corresponds almost completely with the closely related species *vernalis*. The two species are often found together (Skå Kåseberga, Palm; HOR 1941, p. 229). However, *picipennis* seems to be a still more exclusive sand insect. In northern Germany, among others,



found on inland dunes and fallows (GRD 1937, p. 48).

### Biology

The 13 dated Swedish specimens were all collected from May to July. One may tentatively assume that this species (like *vernalis*) breeds in spring and hibernates as an adult.

### Dynamics

Wing dimorphism evident. In the brachypterous form the narrow wing rudiment does not attain even half the length of an elytron. Macropterous specimens are fully winged and certainly capable of flight. However, flight observations totally absent.

### Systematics

The doubts expressed by HOR (1941, p. 229) about the separate specific identity of *picipennis* versus *vernalis* might not be justified (see LTH 1943a, pp. 30 ff.).

\**Harpalus (Pseudophonus) pubescens* Müll.  
(*rufipes* De G., *ruficornis* Fbr.)

### Distribution

*Sweden*: In southern and central Sweden occurring everywhere and very frequent. On Norrland gradually becomes somewhat rarer and more local. The northern boundary might be sharply delimited, and is represented by the following localities: Dlr Transtrand, 1937, 1 specimen (RGS!); Orsa, 1908 (UYT, 1909, p. 298, and in litt.); Hls Ljusdal, 1941 (SJB); Färila, 1941, 2 specimens (LBL, RM!); Ramsjö, 1943 (LDN!); Mdp Liden, 1937 (BRC, RM!); Jtl  
495 Bräcke, Mordviken, 1936, numerous (LTH); Revsund, around 1941, 4 specimens (BGW); Ång (leg.?, coll. GLL, SA!), Härnösand (ZTT, 1840, p. 37; ML!), 1936, 3 specimens (LTH); Örnköldsvik, 1936, rare (LTH); Vbt Holmsund, July 11, 1936, 1 specimen (LTH).

Doubtful: Lapland, "in Lapponia meridionali, rarissime" (ZTT l.c.); "Lapp. merid." (WBG, 1 specimen, RM!).

*Norway*: On the coast and in the southern valleys frequent everywhere; occurrence sparser northward but extends into the Trondheim region. Northernmost localities: 20 Åndalsnes; 24 Dovre, Kongsvoll; 11 Tynset; 27 Trondheim, already found by STM (N.E.T., 1923, p. 276; 1937, p. 146); Orkedal (STM 1877, p. 153); 26 Stadsbygden (STM l.c.); 28 Inderöya; Steinkjer (N.E.T., l.c.).

*Finland:* South of about latitude 64° N universally distributed, then disappears rather abruptly. Northernmost localities: Om Revonlahti (PME); Ok Kajana (STK); Sotkamo (PHJ). Farther north isolated near Ks Kuusamo (MKL, MH!).

*Russian sector:* Only in southern Karelia, frequent and widely distributed, north as far as Kn Semsjärvi, 1942 (CRP!).

*Adjacent regions:* In Denmark found everywhere and very abundant (West 1940, p. 25). Estonia (HAB in litt.; Palm! SAA! including Ösel (HAB 1936a) and Dagö, Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 350), also Ireland (JHS and HLB 1902, p. 568).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 121), Corsica (DEV 1935, p. 40), southern Italy, Sardinia, Sicily, Malta (LUI 1929, p. 96), Greece and Crete (OTZ 1886, p. 209). Northern Africa (BED 1895–1914, p. 144). Azores (JEA 1941–1942, p. 654). Asia Minor (ECH 1922, p. 34). Iran (BOD 1927c, p. 27). The Caucasus (CHD 1846, p. 179; SDR and LDR 1878, p. 77). Kirgizia and western Turkestan (HEY 1880–1881, p. 43). Siberia (among others, SBJ 1880, p. 41; RM!), east as far as Lena (PPP 1906b, p. 57). Japan (according to JEA 1941–1942, p. 654).

### Ecology

A highly eurytopic species of meadow and field terrain. Avoids only the driest fields and pure sand. Decidedly prefers loamy soil but additionally found on humus and peat, as well as on gravel and sand, if only some (often slight) admixture of loam present. Usually occurs in open terrain, often with thick and tall vegetation, but also on forest fringes as well as in parks and sparser forest stands. The species is highly favored by culture, attaining its maximal frequency in cultivated fields (for instance, found in very large numbers under piles of grain, potato-tops, etc.), on building sites, farms, ruderal places, etc., even right in the center of the city. In Central Europe also predominantly a “cultural species” (see GRD 1937, p. 46).

### Biology

Southern Swedish catches: III: 1; IV: 15; V: 72; VI: 152; VII: 118; VIII: 69; IX: 25; X: 2. In Denmark the first maximum abundance only in July–August (LRS 1939, p. 339). As demonstrated by LRS (l.c., p. 413), all pale specimens of this species are not immature; however, I saw numerous undoubtedly freshly emerged beetles from Sweden from July 2 (HLS) and July 20 (Boh) until August 21 (Små), besides one specimen on May 5, 1940 (Gtl). As assumed by LRS (l.c.), in our region too the species is certainly normally an autumn breeder, hibernating in the larval stage, and to a lesser extent, as an adult. The beetle is extremely polyphagous but seems to live mainly on vegetable

food. Both in Sweden (LBL and TGR 1923, p. 15) and the rest of Europe (see West 1940, p. 25; BLK 1925, p. 24; BUR 1939, p. 176; HOR 1941, p. 214) known as a pest of strawberries; additionally eats seeds of trees, corn, *Linum*, *Capsella*, *Ranunculus*, *Polygonum*, *Rumex*, etc. (SAA 1917, p. 283; SOR 1932, p. 87; BUR l.c.; NOT 1943, p. 32). Apparently the larvae can likewise be fed in captivity on cereal grains (BUR l.c.). However, the beetle also consumes animal food, especially insect larvae (BLK l.c.; BUR l.c.; NOT l.c.) and in captivity purportedly preferred horse meat over a vegetarian diet (GRD 1937, p. 28).

### Dynamics

Wings fully developed. In our region only one observation on flight to date (Vrm Lundsberg, spring 1942, WRN), but from the rest of Europe various records of catches at light. Numerous specimens have been found in Finland in sea drift (Frey 1937, p. 436; STÅ 1938, p. 19; PME 1944, p. 38).

### Fossil Records

France, postglacial (LSN 1918b, p. 538). Galicia, glacial (SCL 1916, p. 47).

497

### *\*Harpalus (Ophonus) punctatulus* Dft. (*punctulatus* auct.)

#### Distribution (map in BCH 1938, no. 34)

*Sweden*: Found only on Öld and Gtl, but widely distributed, even though extremely local and generally rare. Northernmost localities: Öld Hornsjön, July 1939, 1 specimen (JNS). Gtl Visby (several collectors!); Stånga, May 26, 1916 (KMN, 1 specimen, VA!).

Doubtful: Små (STH, 2 specimens, MU! Leg.?, 2 specimens, RM!). STH collected the species in large numbers on Öld (MU!).

*Norway*: Absent.

*Finland*: Discovered only recently (HLL, N.E. 1933, p. 119) and found only in a few localities of the southern coastal region. Nl Hangö, seashore, July 10, July 11, 1931, 1 specimen each (HLL l.c.); Snappertuna, Nothamn, July 1943, 1 specimen (NDM!); Sjundeå, Pickala, close to the sea, August 6, 1940, 1 specimen (PFF); Kyrkslätt, small island in the Skärgård, around 1940, 1 specimen (PFF); Äggelby, May 30, 1943, 1 specimen (KNG!); Helsing, Håkansböle, edge of field, from July 1938–1942, total of 10 specimens (HLQ!). Ka Virojoki, July 1940, 1 specimen (Porochin); Viborg (Maijala; N.E. 1935, p. 107, "*brevicollis*"; 1 black specimen MH!). Ik Kuolemajärvi, July 6, 1919, 1 specimen (IVS, MH!); Kuokkala, July 1, 1939 (COL, according to STK).



*Russian sector*: No records.

*Adjacent regions*: In Denmark found in eastern Jylland; however, rather widely distributed mainly on the islands even though quite rare; not known from Bornholm (West 1940, p. 24). Estonia (according to SDL 1872, 1891; no later records); not known from Latvia. Lithuania (HEY 1903). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 349), also Ireland (JHS and HLB 1902, p. 567).

*Total area*: Palearctic species. In Europe south as far as Spain (FUE 1919, p. 117), central Italy (LUI 1929, p. 95), Bulgaria (APF 1904, p. 183). The Caucasus (CHD 1846, p. 167; SDR and LDR 1878, p. 76), Turkmenia (HEY 1896, p. 18). Kirgizia and western Siberia (HEY 1880–1881, p. 43; JAC 1905–1908, p. 375).

### Ecology

This species is less xerophilous than *azureus* and requires a stronger admixture of humus, preferably also loam in the soil; like that species, however, it usually occurs on gravelly subsoil. For this reason *punctatulus* is usually found in places  
498 moderately shaded by shrubs or sparse deciduous trees, with a more or less rich vegetation of herbs, often together with *seladon*. The carabid is probably dependent on limestone, which has also been presumed in the rest of Europe (WHF 1881, p. 31; FWL 1887, p. 45). In Germany occurs more frequent only in "warm regions" (HOR 1941, p. 208).

### Biology

Distribution of the dated Fennoscandian specimens: IV: 2; V: 25; VI: 19; VII: 29; VIII: 4. In Denmark, where a pronounced maximum abundance occurs in May, larvae have been observed in April–May. Hence it appears justified that LRS (1939, pp. 338, 411) should infer that the species hibernates predominantly in the larval stage. However, the appearance in large numbers in spring is odd for an "autumn breeder"; whether development might actually span a period of two years requires investigation. Like other species of *Ophonus*, this species might also be phytophagous, at least in part. It has been observed repeatedly on umbels of Umbelliferae (SDT 1861, p. 161; JNN 1905, p. 194), and once on an ear of rye (Öld Hornsjön, JNS).

### Dynamics

Wings fully developed and certainly functional. However, flight observations are absent. Nevertheless the late and almost sudden appearance of this species in Finland indicates direct immigration across the Gulf of Finland.



## Fossil Record

Galicia, glacial (SCL 1916, p. 47).

*\*Harpalus (Ophonus) puncticeps* Steph.  
(*angusticollis* J. Müll.)

## Distribution

*Sweden*: One old record from Hill, but in recent years a series of records from Skå. Skå Kåseberga, June 9, 1935, 2 specimens, August 1936, 3 specimens (Palm!); Falsterbo, August 22, 1920, 1 specimen (WGR!); Kungstorp, August 7, August 9, 1936, frequent (Palm! KLF! LTH); Nordanå on the Segeå, June 30, 1942, 1 specimen (Palm!); Lund on the Höje-å, June 2, 1938, 1 specimen (HZE!); Kävlinge, August 23, 1937, 3 specimens (LBÅ); Ven, September 13, 499 1936 (NYH!), July 17, 1937 (JNS!); Ålabodarna (north of Landskrona), June 23, 1938, 1 specimen (HZE!); Fjälkinge, June 12, 1937, 1 specimen (KMN, ML!). Hill Särö, April 1888, about 10 specimens, not rediscovered later (SDN, manuscript in MG; 1 specimen, MG! 1 specimen ex coll. WIB, coll. LTH; remaining specimens with ERC lost due to fire).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark, moderately distributed in southwestern Jylland and on the islands (West 1940, p. 24), also on Bornholm (among others, SUS, coll. LTH). Absent throughout the eastern Baltic Sea region. British Isles, including Ireland (Joy 1932, p. 350; LTH 1935d, p. 32).

*Total area*: Western Palearctic species (distribution still not completely known). In Europe south as far as southern France (DEV 1935, p. 40), northern Spain (SBR, C.C. 1928, p. 65), central Italy (LUI 1929, p. 95). Albania (SBR 1926, p. 169). Eastern limit not established to date. Asia Minor and Syria (SBR, l.c. 1926). The Caucasus (LSH 1936, p. 140).

## Ecology

The species lives on open gravelly, probably always loam-mixed soil with sparse but preferably tall vegetation. Near Skå Kungstorp found in large numbers at the edge of a path under dried fascicles of *Rumex (crispus?)* and *Daucus*. Apparently favored by culture. Possibly requires limestone (see NBG 1933, p. 57; LRS 1939, p. 412).

## Biology

Distribution of specimens from the few Swedish catches: IV: 10; V: 1; VI: 5; VII: 1; VIII: 71; IX: 1. In Denmark, from where richer material exists, maximum abundance is found in August. Here a larva was observed at the beginning

of June and numerous immature beetles in June–July (LRS 1939, p. 339). As assumed by LRS (l.c., p. 412), it might thus be an autumn breeder, hibernating at least mainly in the larval stage. The beetle has been observed many times on umbels of *Daucus* (West 1940, p. 24; DEV 1935, p. 40), searching for fruits (JEA 1941–1942, p. 650; according to Dahl 1928, p. 2, the larvae of *Ophonus* species consume the pollen of Umbelliferae; however, see *puncticollis*). It has on the other hand been found feeding on *Helix pomatia* (HOR 1941, p. 212).

### Dynamics

Wings fully developed. In Bavaria observed flying to light several times (Wolf 1935, p. 192). Its late immigration in Skå is conspicuous.

500

### \**Harpalus (Ophonus) puncticollis* Payk.

#### Distribution

*Sweden*: Very rare, and particularly local. Except for two solitary records in Skå and on Öld, found only within an area in central Sweden that is probably continuous with the Norwegian area. Skå Löderup, close to the sea, June 1942, 2 specimens (CHR!). Öld (THS 1869–1895, p. 323; 1 specimen, ML! 1 specimen, MG!), Borgholm (HCK, VM!). Vgl Råda (TBL!); Kinnekulle (MRT 1873, p. 10; BOH, 2 specimens, RM!). Ögl Omberg, Stocklycke, August 31, 1884 (MRT, 1 specimen, MG!), Alvastra, repeatedly found, 1928–1930 (Palm! LTH). Nke Tysslinge, Latorp, May 25, 1918 (JNS!). Almby, Östra-Mark, among others August 2, 1939 (JNS!). Upl Djurö, August 2, 1937, 2 specimens (LTH); Hacksta, around 1922 (ING, coll. LTH); Uppsala region (RGS! KHK! WRN!); Östervåla, July 1907, 1 specimen (OTT!).

Erroneous: Hll (GLL 1896, p. 27); certainly refers to the record of *puncticeps* by SDN). Gtl (BOH 1849, p. 200, = *seladon*, 3 specimens, RM! LTH, E.T. 1924, p. 132, = *rupicola*!).

*Norway*: Eastern part of southern Norway. The area forms a narrow belt from 4 Kragerö (ULL 1899, p. 296); 3 Larvik (NTV 1916, p. 19), through 2 Oslo region, several localities (several collectors!); Hokksund; Ringerike; 12 Hedemarken (ESM; N.E.T. 1923, p. 255), as far as 13 Ringebru; Otta; Bårstad in Lalm (N.E.T., l.c.).

*Finland*: Rare and very local, but in the south rather widely and probably continuously distributed; also on Åland (several collectors!). The northern limit is represented by the following localities: Ta Tammerfors region, repeatedly recorded (GBL! ELF!); Pälkäne (SDM, 5 specimens, MH!); Sa St. Michel (SBJ 1873, p. 126); Kl Parikkala (SBJ l.c.; MH!); Sordavala (LNN). In the Isthmus of Karelia found only near Ik Rautu (SBJ 1871a, p. 334; 1873, p. 126; MH!).

*Russian sector*: Four localities in southern Karelia: Sv Kuujärvi, 1943

(PFF). Ko Tulemajärvi (KNG!); Petrosavodsk (PPP 1899a, p. 17); Kn Munosero (PPP l.c.; MH!).

*Adjacent regions:* In Denmark only one specimen collected near Haderselv in southeastern Jylland (West 1940, p. 24). Estonia, Dorpat (SDL 1872); I saw one specimen from the southeast and a second one without more precise locality data (Dorpat Museum). Latvia (LCK and MIK 1939). In the Leningrad region not certain since OBT (1876) includes only "*puncticollis*" from among the "nonmetallic" species of *Ophonus*. British Isles (Sharp, E.M.M. 1912; LTH 1935d).

- 501 *Total area:* Probably Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 118), southern Italy, Sardinia, Sicily (LUI 1929, p. 95), Greece (APF 1904, p. 183). East as far as Crimea (SBR, C.C. 1926, p. 167). The Caucasus (SDR and LDR 1878, p. 76; SBR l.c.). Southern Siberia (HEY 1880–1881, p. 43; PPP 1907d, p. 9). The older records in literature might possibly refer in part to other, closely related species.

### Ecology

Found on dry gravelly or sandy soil with sparse vegetation (in one case *Pimpinella saxifraga*, *Scabiosa arvensis*, *Convolvulus arvensis*), for instance at sun-exposed places in gravel pits. The species is probably dependent on limestone. Also in Germany, especially in "warm and limy regions" (HOR 1941, p. 211).

### Biology

The few Swedish and Norwegian specimens known to me are distributed as follows: V: 4; VI: 13; VII: 6; VIII: 5. Immature beetles, July 11, 1933 (2 Asker, Brönnöy, STA!), August 2, 1937 (Upl Djurö, LTH). Hence one feels inclined to assume that it is a spring breeder, hibernating as an adult. In Central Europe larvae purportedly seen in May–June (BUR 1939, p. 175)—if only the identification is reliable. Near Upl Djurö one specimen observed, August 2, 1937, which consumed the raw fruit of *Pimpinella saxifraga*.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### Fossil Records ?

England, postglacial (Bell 1922, p. 46). Galicia, glacial (SCL 1916, p. 47). Identifications, of course, very uncertain.



\**Harpalus quadripunctatus* Dej.  
(*seripunctatus* Gyll.)

Distribution

502 *Sweden*: Except for Hjd, found in all provinces and distributed almost throughout the country, although somewhat unevenly. In eastern Små not found to date. The gaps in Norrland might only be apparent; however, the species is very rare in northern Lapland. Northernmost or highest localities are: Vrm Höljes (Palm and LTH 1937, p. 119!); Dlr Lima (OLS!); Älvdalen (HGL, coll. JNS!); Orsa, Fryksås (TJB!); Hls Los (SJB: LBL, RM! Jtl Bydalen (BGW!); Undersåker (RNG, coll. BRD!); Ånn, 1934, 1 specimen (LTH); Åsl Saxnäs, 1939, 1 specimen (NST, coll. LTH); Lyl Tärna, 1935, 1 specimen (RDB, ML!); Sorsele, Ammarnäs (GTZ, E.T. 1932, p. 51!); Pil Arjeplog, Loholm, 1931, 2 specimens (PRS, ML!); Lul Kwickjock, 1924, 1 specimen (LTH); Porjus, 1939, 3 specimens (LTH) 1941, 1 specimen (BGW!); Tol Jukkasjärvi (ZTT 1828, p. 26; "*laevipes*"); Torneträsk, Kaisepakte, June 30, 1928, 1 specimen (Holm!).

*Norway*: Apparently absent in the outskirts of the western part of the country (e.g., the Bergen region), the extreme northeast (Provinces 39 to 41), and the northernmost peninsulas. Otherwise distributed throughout the country, albeit rather unevenly. Northernmost localities: 35 Tromsö and Tromsdal (SPS 1888–1889, p. 116; Rygge, 3 specimens, MO!); 38 Kåfjord and Bossekop in Alta, numerous (several collectors, MO!); Lakselv in Porsanger (JEN, according to STA).

*Finland*: Rather unevenly but apparently continuously distributed almost throughout the country; apparently missing only in the actual Petsamo region. Strikingly, not found to date on the western coast between Ab Nystad (SDM, MH!) and Ob Kemi (ENW, MH!). Northernmost localities: Le Hetta (LGB, coll. STK); Lk Muonio (SBJ 1873, p. 128; MH!); Pallastunturi (RNK); Kittilä (SAD, MH!); Li Ivalojoiki (PPP 1905, p. 97; MH!); Utsjoki (HLL); Onnela (NDM!); Lp Suomunjoki (PPP l.c.; "Saariselkä," MH!).

*Russian sector*: Three localities in the western and southern parts of the Kola Peninsula (PPP 1905, p. 97; all in MH!). In Karelia, in the extreme north near Kk Ruanjärvi (PPP l.c.), and in the south: Ko Petrosavodsk, 1943, numerous (KRV); Sv Kuutlahti, 1942 (Aftén, coll. HLQ!).

*Adjacent regions*: In Denmark widely distributed, also on Bornholm, but not frequent (West 1940, p. 26). Estonia (HAB in litt.); Latvia (SDL 1872, 1891; LCK and MIK 1939). Oddly, not reported to date from Leningrad region as far as I know. British Isles (Joy 1932, p. 351), also Ireland (JHS and HLB 1902, p. 568). The Faeroes (West 1930, p. 20).

503 *Total area*: Palearctic species. In Central Europe predominantly montane, south as far as the Pyrenees (FUE 1919, p. 129), northern Italy (LUI 1929, p. 99), Yugoslavia and Bulgaria (APF 1904, p. 194). East as far as Ural (JAC 1905–1908, p. 380). Asia Minor (according to HOR 1941, p. 223). The Cau-



casus (CHD 1846, p. 179; JAC l.c.). Western Turkestan (according to CKI 1927–1933, p. 1158). Siberia: According to SBR (C.C. 1928, p. 80) in Trans-Baikal the subspecies *motschulskyanus* Schaub. occurs; MÜL (C.C. 1931, p. 61) writes “Siberia” without mentioning a particular subspecies.

### Ecology

Of all our species of *Harpalus*, this is the only pronounced forest species. It lives in deciduous and mixed forests, which are somewhat sparse, not too humid, and have a distinct humus cover; always seems to be found where there is a subsoil of gravel (usually moraine). Vegetation (especially of moss) must be rich. Also at forest fringes as well as in thickets of bushes (especially *Rubus ideaus*), rarely in tall meadow vegetation; at any rate, apparently cannot live without shade. Lives among leaf litter, brushwood, and moss, often on large boulders, and also under the bark of tree stumps. In the fjelds this species, at least in Norway, reaches the *reg. bet.* (N.E.T. 1932, p. 26). In Central Europe especially found in montane forests (RTT 1908, p. 175; Dahl 1928, p. 159).

### Biology

Southern Swedish catches: III: 3; IV: 13; V: 45; VI: 80; VII: 37; VIII: 19; IX: 12; X: 3; XI: 1; XII: 1. In Denmark the maximum abundance is already in May (LRS 1939, p. 341). Records of immature beetles are distributed in Sweden in two periods, first between April 29 (Ögl) and May 30 (Vgl) and second from July 31 (Skå) to September 18 (Vgl). It is thus evident that in our region, as well as in Denmark (l.c., p. 416), not only the adults, but to a considerable extent also the larvae, hibernate.

### Dynamics

Wings fully developed, comparatively better than in *latus*, and certainly functional. Flight observations absent to date however.

- 504 *Harpalus* (*Ophonus*) *rotundicollis* Fairm.: This species was erroneously recorded from Finland (SBJ 1873, p. 126). The voucher specimen belongs to *Scybalicus oblongiusculus* Dej. and certainly does not originate from Finland (HLL, N.E. 1930, p. 75).

### *\*Harpalus rubripes* Dft.

#### Distribution

*Sweden*: Continuously but sparsely distributed in southern and central Sweden, except for the southern Swedish highland. Only on Öld and Gtl almost frequent. It is strikingly missing in southeastern Skå. Northernmost locali-

ties: Boh Fjällbacka, 1924, numerous (LTH), 1936, 2 specimens (CDB, coll. LTH); Dsl Ed (SVS!); Vgl Kinnekulle (leg.?, MG!); Nke Tysslinge, Latorp (JNS, E.T. 1915, p. 204! LBL, RM!); Örebro (JNS l.c.); Vst Strömsund, 1936, 1 specimen (LTH); Upl Uppsala region (many collectors!), at least since 1903 (RMN, RM!); Skutskär, in the harbor, June 28, 1936, numerous (LTH).

*Norway:* On the southern coast, solitary records between 1 Sarpsborg (SIE 1875, p. 104) and 5 Mandal. Also five inland localities in the east, north as far as 24 Sörem in Vågå (N.E.T. 1923, p. 255); finally at the inner end of the Sogne Fjord: 19 Årdal. Completely isolated near 31 Bodö, gravelly southern slope at the sea, north of the city, June 23, June 27, 1925, 6 specimens (LTH).

*Finland:* Only five localities in widely separated southern parts. Al Finström (STN, N.E. 1934, p. 57; MH!). Ab Karislojo (SBJ, MH!); Lojo, 1930, 2 specimens (LBG!). Kl Parikkala, 1872, (SBJ 1873, p. 127; MH! MÅ!). Sa Punkaharju (KNG).

*Russian sector:* Three localities in southern Karelia: Sv, mouth of Swir, 1942 (KRH, N.E. 1943, p. 163!); Kuujärvi, 1943 (PFF!). Kn Munosero (PPP 1899a, p. 17).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 27). Estonia, only 1 specimen near Piirita, close to Reval, June 24, 1938 (MIL, according to HAB in litt.); eastern Latvia (ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 351), also Ireland (JHS and HLB 1902, p. 568).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 129), Corsica (DEV 1935, p. 41), southern Italy (montaine), Sicily (LUI 1929, p. 99), Greece (OTZ 1886, p. 209). Asia Minor and Syria (MÜL, C.C. 1931, p. 58). The Caucasus (CHD 1846, p. 180; SDR and LDR 1878, p. 78). Kirgizia and western Turkestan (HEY 1880–1881, p. 45). Western Siberia (HEY l.c.; SBJ 1880, p. 42; RM!).

A xerophilous species that lives on gravelly or stony fields, less often sandy but sometimes fairly loamy fields in sun-exposed situations and with quite scant, low vegetation (i.e., of *Thymus serpyllum*, *Galium verum*). The species attains maximum frequency in the Alvar† steppes of Öld and Gtl. It is probably favored by limestone (see HRT 1924, p. 278) but not dependent on it. Like *distinguendus*, it appears to be favored by human culture, for instance found at places where adequate dry fields have resulted from artificial drainage, and

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

hence often occurs at ruderal places, in port installations, etc. In Central Europe the species seems to be more eurytopic than in our region and was found even in forests (Rapp 1933, p. 79; GRD 1937, p. 46).

### Biology

Swedish catches: IV: 4; V: 30; VI: 63; VII: 43; VIII: 23; IX: 4. Immature beetles, July 17 (Ble, 2 specimens) and July 29 (Gtl); larvae and one pupa found at the beginning of July (Öld; WGR 1915, p. 84). In Central Europe hibernation takes place in the larval stage (BLK 1925, p. 25); in our region, however, apparently also to a large extent in the adult stage so that LRS (1939, p. 417) is probably correct in designating the species as a "possibly unstable" autumn animal.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### Fossil Record

Galicia, glacial (SCL 1916, p. 47).

*\*Harpalus rufitarsis* Dft.  
(*honestus* et *ignavus* auct. succ.)

### Distribution

*Sweden*: Extremely rare. Three small separate areas. I. Southern Skå: Skanör (THS, 1 specimen, ML!); Kämpinge, May, June, 1886 (PTT, 3 specimens, MG! 1 specimen, coll. GLL, SA!); Håslöv (PTT, according to THS 1869–1895, p. 1030); Romeleåsen, close to Björnstorp, March 27, 1938, male HZE!); Maglehem, Västerboda, August 16, 1930, male (GTZ, coll. LTH). II. Öld Stora-Rör, around 1910 (SDN, 27 specimens, MG!), June 10, 1925, 1 specimen (BRD!); Råpplinge, Greby-Alvar†, 1921, 1 specimen (LTH). III. Ögl Omberg, November 11, 1926, female, October 27, 1927, 2 females (Palm, E.T. 1930, p. 194; 1 specimen, coll. JNS! 1 specimen, coll. LTH).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark rare and only in the southern part of the islands, including Bornholm (West 1940, p. 27). Not found in the Baltic States and Leningrad region. On the other hand occurs in northern Poland (OGI

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

1931, p. 26). British Isles (Joy 1932, p. 352), also Ireland (JHS and HLB 1902, p. 569, "*ignavus*").

*Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 130), central Italy (LUI 1929, p. 100), Greece (APF 1904, p. 196). East as far as Kiev and Yaroslav (JAC 1905–1908, p. 381). Northern Africa (BED 1895–1914, p. 136; JEA 1941–1942, p. 681). Asia Minor (JAC l.c.). The Caucasus (RTT 1900, p. 102; JAC l.c.). I have not been able to decide where the "*honestus*" from western Siberia (SBJ 1880, p. 44) belongs.

### Ecology

Only on Öld was the species collected in somewhat larger numbers on open sandy soil close to the sea. Near Skå Romeleåsen (1 specimen) likewise on sand, near Öld Greby (1 specimen) on Alvar† soil. The record of 3 specimens on Ögl Omberg is strange, two of which were recovered from a dark larch forest; however, larch is cultivated here and hence this occurrence must be considered a possible relict from the earlier sparsely-wooded period in Omberg. Nevertheless, the species occurs in Central Europe in open pine heaths (SRN 1926, p. 21; GRD 1937, p. 48). It appears to live everywhere only on sandy and gravelly soil (West 1940, p. 27; FWL 1887, p. 50), and also on fallow land (GRD l.c.). Probably requires limestone, or, at least, is favored by it.

### Biology

Distribution of the very few dated Swedish specimens: III: 1; IV: 0; V: 1; VI: 2; VII: 0; VIII: 1; IX: 0; X: 2; XI: 1. In Denmark, from where rather rich material exists, the maximum abundance occurs in June (LRS 1939, p. 341). It is probably a spring breeder, hibernating as an adult (LRS l.c., p. 417).

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

507

\**Harpalus rufus* Brügg.  
(*ferrugineus* Fbr., *flavescens* Pill. and Mitt.)

### Distribution

*Sweden:* Very rare, only two localities. From Skå one old record: Ystad (MNH,

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



according to THS 1859, p. 281). According to BOH (manuscript in K.V. Ak.) found by MNH near Degeberga, which undoubtedly refers to the same record. Which of the two statements is correct might no longer be ascertainable. In RM there is 1 specimen, "Scania, BOH" (!), which might well be considered a voucher specimen. Öld (VST, 14 specimens, MG!); according to SDN (personal communication) he and VST found the species under large stones on sand on a stone wall near Stora-Rör (around 1910); he himself has collected no specimens, as he considered them teneral individuals of *hirtipes*.

*Norway*: Absent.

*Finland*: Only one specimen, probably an accidental occurrence, found near Ab Åbo around 1916 (NDM, N.E. 1935, p. 113).

*Russian sector*: Absent.

*Adjacent regions*: In Denmark, only near Rønne on Bornholm, a few specimens collected in 1841 (West 1940, p. 28). In Estonia doubtful (only one old specimen from "Livonia," SDL 1872, 1891); eastern Latvia (ULN 1884); Lithuania (HEY 1903). Also in northern Poland (OGI 1931, p. 27). Not known in the Leningrad region. Absent on the British Isles.

*Total area*: Euro-Caucasian species. In Europe south as far as southern France (DEV 1935, p. 41), northern Italy, Sicily (LUI 1929, p. 101), Bosnia (APF 1904, p. 195), Transylvania (PTI 1912, p. 26). In Russia, north as far as Yaroslav (SEM 1898, p. 79), east as far as Astrachan (JAC 1905–1908, p. 379). The Caucasus (JAC l.c.; MUL, C.C. 1931, p. 70).

### Ecology

All records from Central Europe indicate that this species is predominantly a xerophilous sand animal that occurs on very loose, almost barren sand, among others, in coastal dunes. The species purportedly lives deep in the sand (D.E.Z. 1907, p. 155), especially among roots of various grasses, such as *Corynephorus* (LTZ 1885–1892, p. 24), *Psamma* (NBG 1933, p. 57), *Panicum* (E.B. 1936, p. 171).

### Biology

LRS (1939, p. 416) assumes that the species breeds in autumn and hence hibernates in the larval stage. In Central Europe the species seems to become most frequent just in autumn (E.B. 1930, p. 153; 1936, p. 171); immature beetles have been observed in June (BUR 1939, p. 172) and even in the middle of August (DTZ 1939, p. 53). In captivity the beetle purportedly feeds on larvae of *Melolontha* (BUR l.c.).

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

\**Harpalus (Ophonus) rupicola* Sturm

## Distribution

*Sweden*: Found only on Öld and Gtl, but widely distributed in the latter island and locally even frequent. But strangely it was not collected there by any of the older entomologists; the first record was made in 1905 (Hemse, 1 specimen, WRN!). The southernmost locality is Sundre, 1927, 1934, repeatedly found (LOH! JNS!); the northernmost, Irevik, 1940, 7 specimens (LTH). Öld Glömminge, July 27, 1938, 1 specimen (BUT, according to JNS); Ekerum, August 1-2, 1934, 1 specimen (GTZ, coll. LTH); Borghom, July 1941, 1 specimen (S. Dealander!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark rare, found only on Falster, Møen, and Bornholm (West 1940, p. 23). Absent throughout the eastern Baltic region. British Isles, only England (Joy 1932, p. 349).

*Total area*: Western Palearctic species. In Europe predominantly southern (for instance, extremely local in northern Germany; HOR 1941, p. 208), south as far as Portugal (FUE 1919, p. 117), southern Italy, Sardinia, Sicily (LUI 1929, p. 95), Greece (OTZ 1886, p. 208). East as far as Poland (KTZ, P.P.E. 1923, p. 31; TEN 1931, p. 331), Kiev and Crimea (JAC 1905-1908, p. 375). Northern Africa (BED 1895-1914, p. 144), Asia Minor (RTT 1900, p. 62). The Caucasus (SDR and LDR 1878, p. 76).

## Ecology

Occurs in open places or places weakly shaded by bushes and quite to very dry, with somewhat loamy, limy, or gravelly soil and xerophilous but often quite tall vegetation. Also occurs in vegetation-rich parts of the Alvar†; at the edges of fields and in gravel pits. Typical example: Gtl Visby, May 5, 1940, below the steep limestone slope (toward the west) immediately south of the city; in large numbers on coarse, somewhat loamy limestone gravel. Vegetation: *Daucus*, *Artemisia campestris*, *Centaurea scabiosa*, etc. Successive species: *Brachynus*, *H. melleti* (LTH). Sometimes also found together with *azureus*, which has also been mentioned as a successive species in Germany (E.M.D. 1919, p. 66). This species might actually be dependent on limestone, since all records including

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

those from the rest of Europe as well, seem to be from limestone regions (E.M.D. l.c.; Dahl 1928, p. 149; BRN 1937, p. 15; JEA 1941–1942, p. 647; FWL 1887, p. 45).

### Biology

Distribution of Swedish specimens: V: 44; VI: 40; VII: 19; VIII: 16; IX: 2. Also in Denmark, maximum abundance in May (LRS 1939, p. 338). Immature beetles, July 29 (Gtl), August 1–2 (Öld), August 8 (Gtl). As assumed by LRS (l.c., p. 411) it is certainly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed. One beetle flew to light near Öld Glömminge, July 27, 1938 (BUT).

*Harpalus (Ophonus) schaubergerianus* Puel (Misc. Ent., 38, 1937, p. 91; *rufibarbis* Redt. sensu Schaub. nec Reitt.; *brevicollis* auct. p. p. et Schaub. ante 1936): This species is absent in the region. The female specimen from Gtl assigned by me with reservations to this species (LTH 1935c; accepted by BUR 1939, p. 176 as such) undoubtedly belongs to *seladon*. The Finnish female from Ka Viborg (N.E. 1935, p. 107; LTH 1942a, p. 146), upon re-examination proved to be a black *punctatulus* (MH!).

\**Harpalus (Ophonus) seladon* Schaub.  
(*brevicollis* et *rufibarbis* auct. p. p.; *subpunctatus* Steph. et  
*parcepunctatus* Reitt. sec. JEA 1941–1942, p. 649; also see  
LTH 1943a, p. 25)

### Distribution

*Sweden*: Distributed in southern and central Sweden without gaps and frequent almost everywhere. Northern limits represented by the following localities: Dsl Ed, 1933 (LFF!); Vrm Arvika (RGS!); Ölme, 1936 (WRN!); Vst Nora, 1936  
510 (LTH); Skultuna 1941 (Elworth!); Gst Grönsinka, 1938, 1942 (Palm); Storvik, 1940 (LTH); Hamrånge, June 30, 1936, 1 specimen (LTH). Farther north only one isolated locality: Mdp Ånge, June 14, 1923, 1 specimen (Holm, coll. LTH).

*Norway*: In the southeast rather widely distributed, west as far as 4 Risör, north as far as 2 Ringerike and 12 Gjøvik. In Jæren one locality: Varhaug (HLS 1915, p. 30); finally near 7 Bergen, three localities (SPS 1875, p. 23; 1901, p. 46).

*Finland*: Found only in the extreme south where it is distributed apparently continuously along the southern coast; especially frequent on Åland. Does not extend far into the inland: northernmost localities: Ab Åbo (SBJ 1873, p. 127;

GBL, MH! WLL); Vihti (FA); Sa Taipalsaari (SBJ, l.c.; MH!); K1 Salmis (PFF, N.E. 1938, p. 132).

*Russian sector*: No records to date.

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 24). Estonia (HAB!). Older records from the Leningrad region are doubtful (see *puncticollis*); on the other hand found near Lempaala in the Russian part of the Isthmus of Karelia during 1943 (PHJ in litt.). British Isles (Joy 1932, p. 350; "*brevicollis*"; LTH 1935d).

*Total area*: Probably a Palearctic species. In Europe south as far as southern France (DEV 1935, p. 39), purportedly also in northern Italy (LUI 1929, p. 95). East at least as far as Slovakia (ROU 1930, p. 149) and Poland (SBR, C.C. 1929, p. 179). Northern Africa (SBR, l.c.). Western Turkestan (SBR, C.C. 1926, p. 155). As for the records from the Caucasus and Siberia (HOR 1941, p. 208) I was unable to find any reference to them in the literature.

### Ecology

This is the least xerophilous of all the species of *Ophonus*. It likes shade and occurs in open terrain only at such places where a tall canopy of herbs exists and the soil humidity is not too low. It requires a marked admixture of humus in the soil and thrives best on loamy soil. Predominantly in sparse deciduous forests, parks, and gardens, generally with a special predilection for cultivated terrain, frequently together with *pubescens*. Usually gregarious.

### Biology

Swedish catches: IV: 10; V: 47; VI: 104; VII: 71; VIII: 32; IX: 8. Numerous immature beetles found between July 20 (Boh) and August 10 (Skå). Spring breeder, hibernating as an adult. Like the other species of *Ophonus*, it is  
 511 certainly predominantly phytophagous (ZPT 1931, p. 398). The beetle was once observed in large numbers on the umbels of *Anthriscus silvestris* (Vgl Vänersborg, June 28, 1943, SVS!).

### Dynamics

Wings fully developed. Nonetheless the beetle may not be a regular flier since there are no definite flight observations: it is not possible to decide whether "*brevicollis*" (HST, E.N. 1876, p. 79) collected at light in Hungary belongs here. In Finland eight specimens have been found in sea drift (PME 1944, p. 38).



*\*Harpalus serripes* Quens.  
(*tardoides* V. Hans.)

Distribution  
(map in BCH 1938, no. 9)

*Sweden*: Only in the southeast, almost without exception on the coast. Skå, numerous localities in the south, north as far as: Kävlinge (THS, ML! Roth, HM!); Revingehehd (in the inland); April 24, 1938, 1 specimen (HZE!); Degeberga (THS, 3 specimens, MB!), 1851 (BOH 1851, p. 61); "northeastern Skå" (WLG 1866, p. 6). Små Kalmar (HCK, 3 specimens, VM!), June 1871 (coll. TIM, LU!). Öld, widely distributed, locally frequent, northwards extends into Hornsjön region (JNS 1922! 7 specimens, WRN!). Gtl, widely distributed but only on the coasts, north as far as Visby (BOH 1849, p. 200), 1928, 3 specimens (LTH), and Gothen (BOH, l.c.). One quite isolated locality in the Skärgård of Stockholm: Upl Runmarö (HFS, 1 specimen, LÖ!).

Doubtful: Stockholm region (NBL 1840, p. 203).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark widely distributed but rare, found both in Jylland and on the islands, including Bornholm (West 1940, p. 26). Absent in the Baltic States. Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 353).

*Total area*: Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 133), Corsica (DEV 1935, p. 42), southern Italy, Sardinia, Sicily (LUI 1929, p. 98), Greece (OTZ 1886, p. 209). Northern Africa (BED 1895–1914, p. 136; SBR, C.C. 1926, p. 25). Asia Minor (SBR, l.c.). The Caucasus (CHD 1846, p. 181; SDR and LDR 1878, p. 79). Kirgizia and western Turkestan (HEY 1880–1881, p. 44; RTT 1900, p. 121). Siberia (HEY l.c.; JAC 1905–1908, p. 383; not included by SBR, l.c.).

### Ecology

Markedly xerophilous, found on open sandy or gravelly soil with short, sparse vegetation. On Öld found especially on gravelly Alvar†, in Skå and on Gtl more on sandy fields, usually in the vicinity of the sea. The species is, however, missing on barren dune sand. Also in the rest of Europe, predominantly a sand animal (West 1940, p. 26; GRD 1937, p. 48); whether it also requires limestone (Dahl 1928, p. 162; JEA 1941–1942, p. 684) has not been fully determined.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

## Biology

Swedish catches: III: 1; IV: 4; V: 12; VI: 21; VII: 14; VIII: 5; IX: 1. In Denmark maximum abundance already in May (LRS 1939, p. 342). Two immature beetles found on August 2, 1928 (Gtl Visby). Spring breeder, hibernating as an adult. In Baden it has been observed in the evenings climbing grass stems (Wolf 1940, p. 170); most probably the carabids were looking for food in the ears.

## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### *\*Harpalus servus* Dft.

## Distribution

*Sweden:* Very rare and found only in the extreme south. Skå, earlier found at various places, especially inland sandy regions; in the present century found only in two localities: Saxtorp, June 5, 1922, 1 specimen (ADR, ML!); Löderup, June 20, 1942, 1 specimen (CHR!). Northernmost localities: Saxtorp; Stehag, June 1882 (MLC, 4 specimens, HM!), June 1883 (leg.?, MU! Degeberga (THS, 3 specimens, MB!)), July 1851 (BOH 1851, p. 61). Hll Eldsberga, drift sand on the sea, June 5, 1935, female (Palm, coll. LTH). Öld (HGL, according to GLL 1896, p. 29; AHT, 1 specimen, VA! LDL, coll. WRN!). Stora-Rör region (SDN, 1 specimen, VA!).

Absent in the rest of Fennoscandia. The old record from Norway (SHY 1879, p. 21) must be rejected (MST, N.E.T. 1933, p. 270).

*Adjacent regions:* In Denmark widely distributed (in Jylland only in the southern half), also on the islands, including Bornholm; rather rare (West 513 1940, p. 27). Doubtful in the Baltic States ("in our region"; SDL 1891, p. 57). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 352).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 132), Austria (HOR 1941, p. 230), Transylvania (PTI 1912, p. 27). In Russia, north as far as Yaroslav (JAC 1905–1908, p. 382). The Caucasus and western Turkestan (JAC l.c.). Siberia (HEY 1880–1881, p. 46; JAC l.c.). Mongolia (JAC l.c.). According to JEA (1941–1942, p. 685) occurs in China.

## Ecology

Predominantly a xerophilous sand insect, with a predilection for living in very dry, loose, almost barren sand; among others, quicksand dunes on the

seashores. During the day burrowed in sand. Also in the rest of Europe always found on sand, for example, frequent in the steppe-heath biotope near Oderberg (Mark) (August 1938, LTH). Likes coastal regions (Dahl 1928, p. 161; JEA 1941–1942, p. 685; FWL 1887, p. 52). The beetle often hides under *Calluna*, *Corynephorus*, and similar plants (LTZ 1885–1892, p. 26; GRH 1910, p. 19).

### Biology

Distribution of the few dated Swedish specimens: V: 14; VI: 8; VII: 4; VIII: 3. In Denmark predominantly in May–June and August (LRS 1939, p. 342). It must be a spring breeder, hibernating as an adult (l.c., p. 418). In Central Europe on one occasion large numbers of this species fed on ripening barley seeds (BUR 1939, p. 177).

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

\**Harpalus smaragdinus* Dft.  
(*discoideus* Er.)

### Distribution

*Sweden*: Distributed widely and probably continuously in southern and central Sweden, but very local. The two gaps on the eastern coast might only be apparent, as also the absence of the species to date in Boh. The northern limit  
514 is represented by the following localities: Dsl Mellerud, 1 specimen (FBG!); Vgl Kinnekulle (TBL!); Tived, Unden, 1936 (LTH); Nke Hammar (WNG, E.T. 1880, p. 192); Örebro, 1928 (JNS!); 1931 (WSL!); Vst Strömsholm, 1936, 3 specimens (LTH); Upl Uppsala region (several collectors!); Harg 1936, 7 specimens (LTH); Älvkarleö, June 27, 1936, 2 specimens (LTH).

*Norway*: In the southeast rather widely distributed, with a total of 11 localities, west as far as 3 Brevik (SHY 1879, p. 21); 16 Hiterdal (MST, MO!); north as far as 15 Noresund (HLS 1891a, p. 13); 12 Romerike, Dal. Additionally two (at least apparently) isolated localities: 5 Audnedal; 24 Sörem in Våga, July 1906 (MST, N.E.T. 1923, p. 255; MO!).

Erroneous: 15 Ål (STE 1898; see N.E.T. 1921, p. 89).

*Finland*: A southern and rare species with uneven distribution. On the southern coast there might be an actual gap, since the species could not be recorded in the Helsinki region (which has been the most thoroughly investigated throughout the country). On Åland found only near Jomala (HLL); not found on the islands in the Gulf of Finland. Northernmost localities: Ta

Hattula (WEG); Tammerfors (GBL! MER, MÅ!); Sa Kristina (Streng, MH!); St. Michel (EHN, MH!); Sb Kuopio (SBJ 1873, p. 129; MH!); Kb Juuka, Halivaara, 1940, 1 specimen (KRG!).

Doubtful: Om Gamla-Karleby (SBJ, l.c.; no voucher specimen).

*Russian sector:* Only two localities in southern Karelia: Sv Vaaseni, 1942 (KRV!); Ko Nurmoila, 1942 (PFF!).

*Adjacent regions:* In Denmark, widely distributed (including Bornholm) but not frequent (West 1940, p. 26). Estonia, including Ösel (HAB 1936a, and in litt.); Latvia (Kurland; SDL 1872). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 351).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 124), southern Italy (LUI 1929, p. 98), Bulgaria (APF 1904, p. 193). The Caucasus (SDR and LDR 1878, p. 78; LSH 1936, p. 140). Kirgizia (HEY 1880–1881, p. 45). Western Turkestan (HEY 1893, p. 25). Siberia (JAC 1905–1908, p. 378; PPP 1907d, p. 10), east as far as Lena (PPP 1906b, p. 57).

### Ecology

Predominantly a xerophilous insect that lives in open sun-exposed places with pure sand or sand mixed with gravel (sometimes humus), but not on quicksand. Usually found on larger flat fields with only patches of vegetation, consisting  
515 of *Calluna*, *Thymus*, *Artemisia campestris*, dry grasses, and similar plants. Also in sand pits. Often somewhat burrowed in loose sand.

### Biology

Swedish catches IV: 3; V: 14; VI: 31; VII: 30; VIII: 11; IX: 8. In Denmark a pronounced maximum abundance in June (LRS 1939, p. 340). Numerous immature beetles found between June 27 (Skå, Upl) and July 21 (Skå). As assumed by LRS (l.c., p. 415), the species is probably mainly an autumn breeder, hibernating in the larval stage† but simultaneously a considerable number of adults also hibernate.

### Dynamics

According to WGN (in litt.) this species exhibits wing dimorphism in Germany. In our region I have seen only macropterous specimens to date, which are certainly also capable of flight. In Central Europe flight observations have been reported from Hungary (HST, E.N. 1876, p. 79) and the Berlin region (WGN in litt.).

† ("Imagoüberwinterung" in the German original. Obviously, an inadvertent error; suppl. gen. edit.).



\**Harpalus tardus* Panz.

## Distribution

*Sweden*: Distributed widely and evenly in southern and central Sweden, as well as in southernmost Norrland, without recognizable gaps. Northern limits sharply marked and represented by the following localities: Dlr Transtrand, 1937, 2 specimens (RGS!); Lima, over several years, 4 specimens (OLS!); Våmhus, Höjen, 1928 (FRL!); Hls Bollnäs, 1942 (ALM); Färila, 1941, 1942 (Lind, LBL, RM!); Delsbo region (RUD, 2 specimens, MG!); Mdp Njurunda, 1936, 4 specimens (LTH); Sundsvall region (B. Petri!); Alnö, June 1937, 1 specimen (BRC, RM!).

*Norway*: In the southeast and along the southern coast, west as far as 6 Jæren, Varhaug (HLS 1915, p. 31) and Hana. In the inner valleys only a few localities, north as far as 15 Ål (STE, MB!); 13 Ringeby; 10 Åmot (SIE 1875, p. 105). Finally, one locality in the inner part of Sogne Fjord; 19 Sogndal (MST).

*Finland*: Continuously distributed south of latitude 64° N, but apparently with one gap each on the southern and western coasts respectively, one between Helsinki region (numerous collectors!) and Ka Viborg (BOM, MÅ!), and the other between Ab Kakskerta (BFF, MH!) and Om Jakobstad, two  
516 localities (STÅ!). The species also seems to be missing on the islands in the Gulf of Finland. Northernmost localities moreover: Tb Viitasaari (LBG); Sb Iisalmi (STK); Ok Kajana, 1 specimen (CRP!). One isolated old record: Ks Kuusamo (MKL, 1 specimen, MH!).

*Russian sector*: Only found in southern Karelia, but widely distributed, north as far as Kn Semsjärvi, 1942 (CRP!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 27). Estonia, including Ösel (HAB 1936a and in litt.; Palm!); Latvia (among others SDL, 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 353), also Ireland (JHS and HLB 1902, p. 569).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 132). Corsica (DEV 1935, p. 42), southern Italy, Sardinia, Sicily (LUI 1929, p. 101), Greece (OTZ 1886, p. 209). Northern Africa (Puel, *Misc. Ent.* 46, 1938, p. 41). Asia Minor (Bod 1927a, p. 50). Iran (Bod 1927c, p. 43). The Caucasus (CHD 1846, p. 181; SDR and LDR 1878, p. 79). Turkmenia (HEY 1896, p. 19). Siberia (HEY 1880–1881, p. 46; JAC 1905–1908, p. 382); in the east different subspecies found (according to CKI 1927–1933, p. 1174).

## Ecology

Less xerophilous and generally more eurytopic than the other black species of *Harpalus*. However, it is found predominantly on more or less dry sandy and gravelly soil in open situations, but also where a considerable admixture

of loam or humus occurs, or a fairly continuous, though never tall, cover of vegetation. The species tolerates some shade, for instance, at forest fringes and in sparse, dry coniferous forest. It lives under stones, moss, plant rosettes, etc. or somewhat burrowed in the sand during the day. In Central Europe also mainly in sandy places (West 1940, p. 27; Dahl 1928, p. 163; GRD 1937, p. 48).

### Biology

Southern Swedish catches: IV: 8; V: 70; VI: 109; VII: 53; VIII: 34; IX: 2; X: 1. In Denmark maximum abundance in June likewise pronounced, two larvae found at the beginning of July (LRS 1939, p. 342). LRS (l.c., p. 418) is certainly correct in considering this species a spring breeder, hibernating as an adult. Numerous immature beetles observed in Sweden between July 10 (Dsl) and August 15 (Små); additionally one specimen found on May 8, 1940 (Gtl  
517 Visby), and hence larval hibernation inescapable. The same possibly applies to one immature specimen collected on July 2, 1936 in the very northern locality of Hls Ljusne. In the rest of Europe the species purportedly damages forest seeds and seeds of *Camelina sativa* (BLK 1925, p. 25; BUR 1939, p. 177).

### Dynamics

Wings fully developed and certainly functional. Only one flight observation from Hungary (HST, E.N. 1876, p. 79), but in Finland nine individuals found in sea drift (PME 1944, p. 38).

\**Harpalus vernalis* Dft.  
(*picipennis* Thoms. nec Dft.)

### Distribution

*Sweden*: The species was confused earlier with *picipennis* and hence older records must be ignored, unless voucher specimens are available. At any rate it is found only in Skå, on Öld and Gtl. In Skå, only in the south: Fotevik, July 1940, 1 specimen (Palm!); Trälleborg, April 1861, May, June 1862 (MLF, MG! Va!); Kåseberga, numerous (several collectors!); Kävlinge, repeatedly collected (THS, ML! Roth, ML! HM!). Öld, numerous localities between Södra-Möckleby, 1928 (JNS, also MU!) in the south and Horn (Boh, manuscript in K.V. Ak.) in the north. Gtl Vamlingbo (Boh 1849, p. 200), June 19, 1925, 3 specimens (JNS!); Lilla-Karlsö, May 1941, 1 specimen (LNM!).

Doubtful: Skå Äsperöd (ZTT, according to GYL 1827, p. 440); Degeberga, 1866 (THS 1967b, p. 41, "*vernalis*").

Absent in the rest of Fennoscandia.

*Adjacent regions*: Also in Denmark much more frequent than *picipennis* and more widely distributed, both in southern Jylland and on the islands, in-

cluding Bornholm (West 1940, p. 28). Not known from Estonia. Doubtful (as "*picipennis*") in Latvia (Kurland, SDL 1891) and in the Leningrad region (OBT 1876). Questionable on the British Isles (Joy 1932, p. 352, "*picipennis*").

*Total area:* Palearctic species. In Europe south as far as southern France (DEV 1935, p. 42), central Italy (LUI 1929, p. 10; PTA 1934, p. 89), Albania (MÜL, C.C. 1931, p. 69). East at least as far as Poland and the Ukraine (TEN 1931, p. 331), Slovakia and Rumania (SBR, C.C. 1928, p. 82). The Caucasus (MÜL, l.c.). Western Turkestan (SBR, l.c.). Western Siberia (among others, SBJ 1880, p. 44, "*picipennis*"; RM! SBR, l.c.).

518

### Ecology

Markedly xerophilous. Occurs in open, sun-exposed sandy fields with sparse, low vegetation. On Öld, additionally found on gravelly Alvar† soil. In Central Europe a true sand animal (West 1940, p. 28; BUR 1939, p. 178).

### Biology

Distribution of dated Swedish specimens: IV: 5; V: 16; VI: 40; VII: 10; VIII: 16. In Denmark a more pronounced maximum abundance in June (LRS 1939, p. 342). LRS (l.c., p. 417) is certainly correct in considering this species a spring breeder, hibernating as an adult; this is also indicated by the record of a teneral beetle on October 12 near Leipzig (DTZ 1939, p. 54). From Sweden, however, there is one immature specimen collected on May 18, 1937 (Skå Kåseberga, NYH!), and hence in certain cases larvae too might possibly hibernate.

### Dynamics

This species seems to be constantly brachypterous. In all the Swedish specimens examined the wings are reduced to a narrow scale that barely attains one-fourth the length of an elytron.

*\*Harpalus winkleri* Schaub.  
(*luteicornis* auct. p. p.)

### Distribution

Due to the earlier confusion with the true *luteicornis*, the actual distribution in the southern part of Fennoscandia is still not clear. In the north and in the mountains *winkleri* is the only species; south of latitude about 62° N the reports can be considered only after examining voucher specimens.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



*Sweden*: In the south quite sporadic in occurrence, but found in most of the previous south as far as Skå (two records of *luteicornis* from Vrm could not be checked). From Dlr north distributed more continuously but mainly inland; in Lapland occurs only in the fjeld regions in direct continuity with the Norwegian area. In the Bothnian coastal region known only from Hls, Mdp, and near Nbt Karl-Gustav (June 27, 1941, 1 specimen, SJB!). Northernmost in Lul Sarek region (JSN 1926, pp. 900, 908; LTH) and near Tol Pålnoviken (BRD 1934, p. 227), July 18, 1939, 6 specimens (LTH).

519 *Norway*: In the north between latitudes 65° and 70° N, several localities and apparently continuously distributed, north as far as the islands north of Tromsø in Province 35 (SPS 1888–1889, p. 115, "*luteicornis*"). In the south sporadic but still occurs in the Oslo region (voucher specimens have been examined to date only from Provinces 1, 2, 15, 19, and 24; probably the records from Provinces 7, 12, 13, and 22 also belong here).

*Finland*: Only quite solitary localities. In the south much rarer than *luteicornis* (however, this is the only species occurring in AI), north as far as Tb Viitasaari (LBG!) and Kb Pielisjärvi (LNN, MH!). Finally near Lp Pummanki in the extreme north (LNN, 1 specimen, MÅ).

*Russian sector*: Three localities on the coasts of the Kola Peninsula (PPP 1905, p. 97, "*luteicornis*"; MH!), east as far as Lj Ponoj (ENW, SBJ, MH! MÅ!). In southern Karelia (Sv) near Vaaseni (KRV!) and Kuujärvi (1943, 4 specimens, PFF!).

*Adjacent regions*: In Denmark rather rare: northern Jylland, Fyn, Sjaëlland, Bornholm (West 1940, p. 26; HSN and LRS 1941, p. 199). Doubtful ("*luteicornis*") from the Baltic States (SDL 1872, 1891) and in the Leningrad region (OBT 1876). Not known from the British Isles.

*Total area*: Palearctic species. In Europe south at least as far as Holland (SBR, C.C. 1930, p. 205) and northern Italy (SBR l.c.). East as far as Poland and Crimea (*loc. class.*; SBR, C.C. 1928, p. 80). Siberia: SBR (l.c. 1930) mentions "a species very closely related to *winkleri* (perhaps only a race of *winkleri*)" from Trans-Baikal. I saw one specimen each from Krasnoyarsk (SBJ 1880, p. 42, "*luteicornis*"; MÅ!) and Ajan (south of Okhotsk; MH!), which I was unable to differentiate from our *winkleri*.

### Ecology

In its mode of life this species is closest to *4-punctatus*, with which it may also be found together. It thus requires some shade of sparse stands of deciduous trees (frequently *Betula*), bushes (such as *Rubus idaeus*) or tall herbage (in the fjelds, e.g., *Geranium silvaticum*). The soil consists of more or less loam-mixed gravel (usually moraine). Its dependence on forest and humidity requirement are somewhat less compared to *4-punctatus*; hence it is often found on forest fringes, in felling regions, gravel pits, etc., in fairly open situations. In the *reg.*



- 520 *bet.* of the fields found regularly; one specimen even found in the "pasture† zone" of the lower *reg. alp.* (Lul; JNS 1926, p. 908); in the tundra of the Kola Peninsula two localities (PPP 1910a, p. 316). In Denmark its mode of life is similar to that in our region (West 1940, p. 26; HSN and LRS 1941, p. 199).

### Biology

Distribution of southern Swedish specimens: IV: 3; V: 14; VI: 18; VII: 5; VIII: 2. In Denmark maximum abundance already in April (LRS 1939, p. 341). Immature beetles, July 29, 1936 (Jtl Bräcke, 3 specimens) and August 18, 1939 (Lul Sarek). Undoubtedly a spring breeder, hibernating as an adult.

### Dynamics

Wings fully developed with a stronger apical part than in *latus*. Spontaneous flight observed on June 10, 1922 (Dlr Ludvika, FRL!).

\**Lebia chlorocephala* Hoffm.

### Distribution

*Sweden*: Distributed throughout southern and central Sweden without discernible gaps. Very rare on Öld and Gtl: Öld Stora-Rör, 1928, 1 specimen (JNS!); Gtl Isums, 1867 (BOH 1867, p. 615; 1 specimen, RM!); Lau-Myr, July 1923, 1 specimen (LTH). To date no locality on the eastern coast of Skå. Northern limit represented by the following localities: Vrm Arvika region (RGS! EVK!); Munkfors (KLF); Vst Grythyttan (LTH); Dlr Ludvika (FRL! WSL!); Sollerön, May 20, 1918 (KLF); Hls Bollnäs, June 16, 1942 (ALM); Forsa (leg.?, old specimen, RM!); Hennan, June 23, 1943 (BGW).

*Norway*: In the southeast widely and continuously distributed, west as far as 4 Grimstad (MO!); north as far as 15 Kongsberg; 2 Vikesund (STE, MB!); 12 Gran and Gjövik; 13 Lillehammer (coll. HSS); 10 Odalen.

Doubtful: Stavanger (SIE 1875, p. 91; no voucher specimen).

*Finland*: South of latitude 62° N almost universally distributed but to date not known on the western coast between Ab Nystad (SDM, HLL, MH!) and Om Jakobstad (STÅ, according to HLL); likewise on the islands in the Gulf of Finland. Northward gradually becomes rare; northernmost localities: Oa Seinäjoki (KNG, PHJ); Om Kauhava (PHJ); Sb Iisalmi (STK); Om Revonlahti (PME); Ob Kemi (CST, according to SBJ, 1873, p. 93; no voucher specimen, but probably not questionable).

- 521 *Russian sector*: In southern Karelia, north as far as Kn Semsjärvi, 1942 (CRP!).

† (Probably "willow zone" instead of "pasture zone"; suppl. scient. edit.).

*Adjacent regions:* In Denmark widely distributed (including Bornholm), but not frequent (West 1940, p. 47). Estonia including Ösel (HAB 1936a and in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 371), also Ireland (JHS and HLB 1902, p. 591).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1921, p. 204), central Italy (LUI 1929, p. 137), Serbia (APF 1904, p. 323). The Caucasus (JAC 1905–1908, p. 397); western Turkestan (HEY 1896, p. 22). Western Siberia (among others, SBJ 1880, p. 22; RM!).

### Ecology

Predominantly a meadow species, requiring moderately moist soil with rich and often tall vegetation of grasses and herbs; likes loamy soil and is even found on peat soils. Occurs especially at forest fringes, edges of paths and fields, in grooves, etc., always at more or less sun-exposed places. In spring often gregarious under large, flat, widely warmed stones, later among roots of grass, in leaf litter, etc., often under the moss cover of boulders. In the evening climbs plants and can be swept. In Central Europe quite eurytopic (West 1940, p. 47; Dahl 1928, p. 186; Rapp 1933, p. 140).

### Biology

Swedish catches: III: 11; IV: 18; V: 28; VI: 55; VII: 21; VIII: 6; IX: 12; X: 5; XI: 1. In Denmark maximum abundance likewise in June, but the summer decline already seen in July; larvae found in July (LRS 1939, p. 346). Undoubtedly a spring breeder, hibernating as an adult (l.c., p. 425). In our region immature beetles found on August 3 (Upl) and at the end of August (Hill); additionally one specimen March 25, 1933 (Ögl Motala), which indicates that exceptionally larvae too may hibernate. The beetle purportedly preys on larvae of Chrysomelidae, for example, *Chrysomela fastuosa* Scop. (WPK 1886, p. 340) and *varians* Schall. (WHF 1881, p. 15). RSB (E.M. 1903, p. 15) assumes that the larvae attack the same prey also. On the other hand it has been mentioned that species of *Lebia* feed on aphids (GGL 1892, p. 398; West 1940, p. 47), and I observed beetles in captivity (Upl Djursholm) feeding on aphids of *Sambucus racemosa*.

### Dynamics

Wings fully developed, somewhat narrower but otherwise not much weaker than in *crux-minor* (on the other hand, see RSB, E.M., 1903, p. 398) and are certainly functional. Flight observations absent but on two occasions (Upl Djursholm, September 1941), I saw how a beetle exposed upon sun and artificial light raised its elytra, unfolded its wings, and thus prepared for flight;

however, actual takeoff did not occur. In Finland, three beetles were found in sea drift (PME 1944, p. 39).

*\*Lebia crux-minor* L.

Distribution

*Sweden:* Except for Hjd, found in all provinces, but in no way universally distributed. In the fjelds totally absent and likewise also in most parts of the Norrland forest region. In the actual southern Swedish highland there is only one locality: Små Öster-Korsberga, 1926, 1932 (GTZ!). The only gap in distribution that might be real occurs in the Bothnian coastal region, between Vbt Hällnäs, Bodarna, June 6, 1935, 1 specimen (HEQ!) and Nbt Luleå, May 1938, 1 specimen (LTH). Northernmost or highest localities are: Vrm Boda, Högboda, 1936 (GTZ!); Dlr Leksand (SPB!); Hls Los, 1942, not seen earlier (SJB); Jtl Revsund, 1942 (BGW); Ragunda (SLL, RM!); Ulriksfors, 1936 (LTH); Lyl Örtträsk (E. Jansson, MG!); Lycksele, 1936 (LTH); Nbt Råbäcken at the Lule-älv† (BOH 1844, p. 96); Neder-Kalix, 3 specimens and Karungi, 1 specimen, 1930 (LTH and Palm 1934, p. 41!).

*Norway:* In the southeast, numerous localities and rather continuously distributed, west as far as 4 Risör; 16 Saude (SHY 1879, p. 16); 15 Kongsberg; north as far as 2 Ringerike (SHY l.c.); 12 Biri and Gjøvik; 13 Lillehammer; 11 Rendalen. Finally two localities at the inner end of Sogne Fjord: 18 Årdalstangen; Lærdal (STE, 2 specimens, MB!).

*Finland:* In southern and central Finland widely and continuously distributed; the gap in Tb and Sb might not be actual. In the western coastal region occurs probably as far as the Swedish border, but to date found only north as far as Ob Uleåborg (WUO, MH!). In the eastern inland as far as Kb Pielisjärvi (LNN, MH! MÅ!).

*Russian sector:* Only four localities in southern Karelia, north as far as Ko Petrosavodsk (PPP 1899a, p. 12; MH!) and Kn Kischi (PPP, l.c.).

523 *Adjacent regions:* In Denmark found only on the islands (including Bornholm), widely distributed but rare (West 1940, p. 47). Estonia (SDL 1872; HAB in litt.); Latvia (ULN 1884, LCK and MIK 1939). Leningrad region (OBT 1876), British Isles (Joy 1932, p. 371), also Ireland (OMH 1929, p. 24).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1921, p. 205), southern Italy (LUI 1929, p. 137), Greece (OTZ 1886, p. 212). Northern Africa (BED 1895–1914, p. 249). Asia Minor (APF 1904, p. 323; BOD 1927a, p. 68). Syria (according to CKI 1927–1933, p. 1319). Iran (BOD 1927c, p. 43). The Caucasus (SDR and LDR 1878, p. 65). Kirgizia and western Turkestan (HEY 1880–1881, p. 19). Siberia (among others, SBJ 1880, p. 22; RM!), east as far as Amur (HEY 1893, p. 28; BOD 1927b, p. 56). Japan (according to CKI, l.c.).

† (“älf” means river in Swedish; suppl. scient. edit.).



## Ecology

In its mode of life this species corresponds largely to *chlorocephala*, and hence occurs on moderately moist, sometimes rather dry meadow soil with more or less rich vegetation of grass and herbs, often at forest fringes or in groves; possibly always on gravelly soil (moraine). It likes to climb plants, even bushes and low trees, and can therefore be swept. Usually solitary. A predilection for limestone (Dahl 1928, p. 186) does not occur in our region. In Central Europe often caught from Umbelliferae, *Hypericum*, *Achillea millefolium*, and other plants (SDT 1841, p. 103; West 1940, p. 47; RSH 1842, p. 9; LTZ 1885–1892, p. 43; Rapp 1933, p. 140; BUR 1939, p. 190).

## Biology

Southern Swedish catches (Skå-Hls): IV: 8; V: 15; VI: 15; VII: 18; VIII: 21; IX: 4; X: 1. In Denmark maximum abundance also in August (LRS 1939, p. 346). Immature beetles at the end of July: July 22, 2 specimens (Sdm), July 29 (Upl), in Denmark at the end of August (l.c.). Undoubtedly a spring breeder hibernating as an adult. In Austria the beetle purportedly feeds on "chrysomelid larvae" (HEB and MEX 1933, p. 118). In our region it is found almost always (or always ?) at places where *Galeruca tanacetii* L. (in one case *G. laticollis* C.R. Sahlb.) lives. It was thus presumed (RSB, E.M. 1911, p. 182) that not only the beetle but also its larva (which, however, is not known) feeds on this chrysomelid. A careful study of this question would be of great interest, especially in view of the known hypermetamorphosis of *L. scapularis* Fourc. living on *Galerucella*.

## Dynamics

Wings fully developed. Spontaneous flight observed on May 6, 1934 (Ögl Omberg, LTH) and also in Germany (HRT 1924, p. 280; Wolf 1936, p. 263). In Finland two specimens found in sea drift (Frey 1937, p. 437; PME 1944, p. 39).

### \**Lebia cyanocephala* L.

#### Distribution

(map in BCH 1938, no. 15)

*Sweden*: Rare throughout and only sporadic. Distribution divisible into two apparently well separated areas. I. In the southeast: Skå Sjöbo, July 30, 1851 (BOH 1851, p. 60); "Kbg" (probably = Kullaberga near Stehag; MLC, 2 specimens, HM!); Degeberga (THS, 1 specimen, ML!). Ble, four localities, most recently near Hällevik, July 1936 (SJB). Små Kalmar area (several collectors!). Öld, five localities between Glömminge, Isgårde and Böda. Mellböda (both localities:



Boh, manuscript in K.V. Ak.), even in 1942, near Borgholm (Palm). Gtl six localities, north as far as Visborgsslätt, August 1928, 1 specimen (LTH). II. Narrow belt across central Sweden: Vgl Göteborg, Delsjön, November 8, 1896, 1 specimen (SDN, MG!); Skövde (ERL!); Karlsborg, 1922, 1 specimen (TJB, E.T., 1928, p. 26). Boh Gullmar Fjord (STX, MG!). Dsl Bolstad, Bodane, 1933, 1 specimen (LFF!); Mellerud region (FBG!). Ögl (probably Norrköping region; ADZ, MS!). Nke Örebro, 1 specimen (JNS, E.T. 1915, p. 203!). Sdm Toresund (SDN, MG!). Stockholm region, repeatedly collected, lastly near Råsunda, June 1844 (LDN). Vst Västerås region (SLL, 1 specimen, VA!). Upl Runmarö, 1899, 1900, 1902, 1905, 5 specimens (HFS, LÖ!); Vassunda (LBL, 1 specimen, RM!); Uppsala, earlier by several collectors (!) and often numerous (LBL, E.T., 1911, p. 210), nearly all records between 1896 and 1906, but recently again one specimen on Tunåsen, September 29, 1941 (LBL, RM!); Singö (RGS).

Doubtful: Dlr (JHN, 1 specimen, LV!).

*Norway:* Exclusively in the southeast, where it has almost exactly the same distribution as *chlorocephala*, but occurs somewhat more sparsely. West as far as 4 Grimstad; 15 Saude (SHY 1879, p. 16); Kongsberg; north as far as 12 Gran and Gjøvik; 10 Odalen (SHY l.c.).

525 *Finland:* Rare, two small separate areas. I. In the southeast: Al Jomala, 1919, 2 specimens (LBÅ 1924a, p. 32!); Finström, 1942, 1 specimen (LBG!); Föglö (FRS, MH!). In the mainland several localities, north as far as St Yläne (SBJ 1873, p. 93; MH!); Ta Hattula (WBG); east as far as Helsinki, Gumtåkt, August 27, 1942, 5 specimens (STN!). II. Two localities in the southeast: Ik Muolaa, 1 specimen (PME!); Ki Parikkala (HLL).

*Russian sector:* No records.

*Adjacent regions:* In Denmark only on Bornholm, 2 old specimens (West 1940, p. 47). Estonia, only near Dorpat (HAB in litt.); Latvia (SDL 1872), Riga (LCK in litt.). Leningrad region (OBT 1876; BSK 1925), Lempaala, 1942, 1 specimen (PHJ!). British Isles, only England (Joy 1932, p. 371).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1921, p. 204), Corsica (DEV 1935, p. 57), southern Italy, Sardinia, Sicily (LUI 1929, p. 137), Greece (OTZ 1886, p. 212). Northern Africa (BED 1895–1914, p. 247). Asia Minor (APF 1904, p. 323; BOD 1927a, p. 46). Iran (BOD 1927c, p. 66). The Caucasus (CHD 1846, p. 61; SDR and LDR 1878, p. 65). Western Turkestan (HEY 1880–1881, p. 18). Western Siberia (HEY l.c.; JAC 1905–1908, p. 396).

### Ecology

Compared with the two remaining species of *Lebia*, this species is markedly xerophilous. It lives on open, dry, sandy or gravelly, grassy or meadow soil

without shade; on Öld in grass-rich places of the Alvar†. Always solitary. In Norway found in large numbers on withered Compositae, e.g., *Sonchus*, *Cirsium*, *Carduus*, and *Hieracium* (SHY 1879, p. 16). Also in the rest of Europe on various kinds of plants such as *Hypericum* and *Achillea millefolium*, even on bushes and trees (DLT 1879, p. 19; CRN 1884, p. 12; Dahl 1928, p. 186; FWL 1887, p. 137; BUR 1939, p. 190).

### Biology

Distribution of the few dated Swedish catches (and specimens!): IV: 1; V: 1; VI: 3; VII: 9; VIII: 3; IX: 2; X: 1; XI: 1. One immature beetle collected on July 12, 1942 (Öld Halltorp, Palm!). In Central Europe copulation purportedly has been observed in April (BLK 1925, p. 37; BUR 1939, p. 190). Hibernation certainly occurs in the adult stage. Association with a particular prey has not been established for this species. According to records from Central Europe (BLK, l.c.; BUR l.c.) the larva (which however, has not been described) feeds on all types of worms, mollusks, and insects.

526

### Dynamics

Wings fully developed and certainly functional. There are no observations on flight, but in southern France the species was found in a fort "sur le parapet de la jetée, ou il est entraîné par le vent d'Est††" (CAI 1908, p. 150).

### \**Leistus ferrugineus* L.

#### Distribution (map in DEV 1930, p. 125)

*Sweden*: From Skå as far as Jtl somewhat unevenly but apparently continuously distributed; only in Hls an apparent gap (see the section "Doubtful" below). Northernmost localities: Mdp Njurunda, 1936, 1 specimen, (LTH); Boda Pal-jacka summit, 1935, 1 specimen (BRC, RM!); Jtl Ragunda (FRI, VA! NST, coll. SJB); Åre and Skalstugan, 1840 (ZTT, ML!); Jorm, three localities, only 1 specimen each, 1932 (JNS and Palm, E.T. 1936; p. 183!). Totally separate, in continuity with the Norwegian area, the localities Tol Abisko and Björkliden, repeatedly collected but singly (JNS, E.T. 1914, p. 103! BRD 1931, p. 8; 1934, p. 214).

Doubtful: Hls (STH, 1 specimen, MG! Leg.?, 1 specimen, RM!). "Laponia merid." (Boh, 1 specimen, RM!).

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

†† (On the railing of the pier, where it has been drifted by the east wind; suppl. scient. edit.).

*Norway:* From the Swedish border as far as the high north somewhat unevenly but certainly continuously distributed. Missing only in the outermost fringe of the western part of the country (for example, in the Bergen region) as well as in the extreme northeast (east of North Cape). Other small gaps might only be apparent. Northernmost localities: 35 Nordfugløy (SPS 1885a, p. 27); 38 Sopnes (STE, MB!); 37 Hammerfest and North Cape.

*Finland:* In the south (including Åland) widely and continuously distributed; in the inland extends farther northward. West and north delimiting localities: Ab Nystad (SDM, MH!); Ta Ruovesi (KNG); Tb Viitasaari (LBG); Sb Kuopio and Nilsiä (LEV, MH!).

*Russian sector:* Only three localities in southern Karelia, 1942 (KRV! KRH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and fairly frequent (West 1940, p. 6). Estonia including Dagö (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 327), also Ireland (JHS and HLB 1902, p. 560).

527 *Total area:* Euro-Caucasian species. In Europe south as far as the Pyrenees (FUE 1918, p. 38; DEV 1935, p. 18), northern Italy (LUI 1929, p. 44). Bulgaria (APF 1904, p. 51). In Russia east as far as Volga (JAC 1905–1908, p. 259). The Caucasus (BNN 1925, p. 334).

### Ecology

Of the three species of *Leistus* in our region, this species has the least requirement for humidity and shade and is considered almost xerophilous. It lives on the one hand in more or less sparse forest stands, especially at their fringe, in bushes and brushwood, under leaf litter and in moss, always on fairly dry, often very rocky, gravelly, or sandy soil, preferably facing southward. On the other hand, occurs in open, though not too dry meadows and fields with rather rich vegetation, especially among roots of grass; often together with *Calathus erratus*. Everywhere prefers gravel and sand. In the Norwegian fjelds (SPS 1888–1889, p. 95), in Jtl and Tol it extends high into the *reg. bet.* In Central Europe the species also seems to inhabit more humid places (West 1940, p. 6; RTT 1908, p. 91; BUR 1939, p. 50); however, at least in northern Germany, apparently as in our region, it is almost xerophilous (Dahl 1928, p. 35; GRD 1937, p. 38).

### Biology

Southern Swedish catches: II: 1; III: 2; IV: 14; V: 35; VI: 91; VII: 47; VIII: 36; IX: 25; X: 11; XI: 1. Numerous immature beetles between May 5 (Dsl) and July 3 (Små). In Denmark, in addition to the maximum abundance in June, a second peak occurs in September; numerous larvae found in all winter months



(LRS 1939, p. 317); also one larva found in Finland in January (LEV 1913, p. 102). It is hence an autumn breeder that hibernates predominantly in the larval stage.

### Dynamics

Wings fully developed but relatively much smaller than in *rufomarginatus*, and with unusually weak veins. The reflexed apical part is very small and obtusely rounded. In my opinion the insect must be considered flightless, and the report from Elberfeld "not rare in gas tanks" (CRN 1884, p. 9; see p. 15 above) is very strange (see also *Calathus fuscipes* and *Dyschirius globosus*). It is also striking that this widely distributed and often numerous occurring species is totally absent in Finnish sea drift material (Frey 1937; STÅ 1938; PME 1944). The beetle, however, is an extraordinarily fast runner and in view of its eurytopic character, its capability of dispersal must nevertheless be considered good.

### \**Leistus rufescens* Fbr.

#### Distribution

(map in BCH 1938, no. 82)

*Sweden*: Probably uninterruptedly distributed across southern and central Sweden and in the Bothnian coastal region as far as the Finnish border, but in the north rare and very local. The localities in the fjeld regions (Hjd, Jtl, Lyl) seem to be connected with the Norwegian area. In some smaller regions the species seems to be absent, such as on Gtl, on the southern coast of Skå, in the vicinity of lake Mälaren, possibly also on the eastern coast (in Ögl and northern Små). Northernmost or highest localities are: Hjd Fjällnäs, Hammarfjäll, 1934, 1 specimen (BRC, RM!); Jtl Östersund 1933 (FHL!); Åre, 1840 (ZTT, ML!); Jormalia, July 10, 1932, 5 specimens (JNS and Palm, E.T. 1936, p. 183!); Ång, without locality (GLL, SA!); Vbt Hällnäs, Bodarna, 1936, 1 specimen (HEQ!); Kusfors, 1930, 1 specimen (LTH and Palm 1934, p. 32!); Nbt Över-Kalix and Neder-Kalix, 1930, 1 specimen, each (LTH and Palm, l.c.); Lyl Tärna, Laxfjäll, July 8, 1937, 1 specimen (Holm, coll. LTH); Lul Pålkem, August 14, 1940, 1 specimen (LTH).

*Norway*: Sparse, but at least south of the Arctic Circle certainly continuously distributed. It avoids the actual fjelds, but not western part of the country. It is not certain whether the gap on the southeastern coast between 3 Tönsberg (HLS 1891a, p. 8) and Kristiansand (ULL) is actual. Highest localities in the south: 10 Åmot (MST); 23 Grindaheim (MST); 24 Sörem in Vågå (MST). North of the Arctic Circle: 31 Bodö (according to SPS), June 1925 (LTH); 36, three localities in Målselv (SPS 1888–1889, p. 95; N.E.T. 1932, p. 23); 38 Kåfjord and Bossekop in Alta (SNR 1862, p. 327; SPS l.c.; MST).



*Finland:* In southern and central Finland, distributed continuously and apparently without gaps but rather unevenly. On Åland only one locality: Hammerland (LBG!); also in Hogland (SRS, MH!). Northward scarcer but in the coastal region as far as the Swedish border. Northernmost localities: Kb Nurmes (MK); Ok Kajana (CRP!); Om Haapavesi (HEL, NL!), Ob Uleåborg (WUO, MH!); Kemi (SBJ, MH!).

- 529 *Russian sector:* Four localities in southern Karelia (PPP 1899a, p. 7; MH! PFF!). Completely isolated near Lt Nuortijärvi in the western part of the Kola Peninsula (PPP 1905, p. 85; MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) but generally not frequent (West 1940, p. 6). Estonia (HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 327), also Ireland (JHS and HLB 1902, p. 560). Shetland (West 1930, p. 74).

*Total area:* Palearctic species. In Europe south as far as northeastern France (DEV 1935, p. 18), Tirol (HOR 1941, p. 73), Transylvania (PTI 1912, p. 9). North-east as far as Mezen region in Russia (PPP 1908, p. 4). Western Siberia (HEY 1880–1881, p. 14; SBJ 1880, p. 8). Northern Mongolia (BNN, K.R. 1928, p. 7).

### Ecology

This species requires strong shade and higher soil moisture than the other two species. It therefore lives almost exclusively in deciduous and mixed forests on brooks and springs, and in swamps among moss and wet leaf litter. In sparser forest stands tree shade may be replaced by tall herbs (e.g., *Filipendula ulmaria*). In dark brook ravines frequently found together with *Trechus rubens*, in *Alnus glutinosa* swamps, especially where trees are situated on distinct mounds, usually together with *Agonum fuliginosum*, sometimes with *Trechus rivularis*. Also recorded from Finland from bog forests (RNK 1938, p. 64). In Norway (SPS 1910a, p. 64), in Hjd and Lyl it ascends into the *reg. bet.* Only rarely found with *ferrugineus*, and reports from Central Europe that the two species have the same mode of life (CLS 1851, p. 108; RTT 1908, p. 91) have been amended by later observations that fully accord with ours (JNN 1905, p. 167; Dahl 1928, p. 35; HEB and MEX 1933, p. 56; Wolf 1939, p. 9; also according to FWL 1887, p. 14). In Bohemia it occurs in peat bogs but always in shaded places (ROU 1934, p. 76).

### Biology

- Southern Swedish catches: V: 17; VI: 73; VII: 24; VIII: 20; IX: 4; X: 3. Very numerous immature beetles between May 10 (Hll) and June 30 (Små). In Denmark numerous larvae found in November and from January to the beginning of May (LRS 1939, p. 317); in Germany larval hibernation has also been observed (DTZ 530 1936, p. 48). As in Denmark (LRS, l.c., p. 361), the adults in our region do not seem to hibernate.

## Dynamics

Wings somewhat larger, their veins somewhat stronger than in *ferrugineus*, namely the apical part better developed. They are comparatively weaker than in our *rufomarginatus*, however, and the apical part much shorter. It appears doubtful to me therefore that *rufescens* is capable of flight. Nevertheless in more humid forest regions its capability of dispersal is not altogether minimal.

\**Leistus rufomarginatus* Dft.

## Distribution

*Sweden*: Markedly southern species. In Skå very widely distributed, especially inland; on the southern coast only one locality: Sandhammaren, Skillinge, June 1931, 1 specimen (Palm). Northernmost localities: Kullen (THS, MB! BOH 1863, p. 67; LBL, RM!); Vrams-Gunnarstorp (BRK); Östra-Broby, 1935 (NYH!), Tydingen, 1935 (LOH); Immeln, Skarvik, 1935 (LOH!). Hill "Dömmestorp och Skottorp," 1883 (MRT, 1 specimen, MG!); Övraby, Sperlingsholm, before 1920 repeatedly collected, later searched for in vain (FGQ, E.T. 1922, p. 192!). Ble Sölvesborg, 1928–1935, repeatedly found (Holm! LOH!); Ronneby 1928–1936, repeatedly found (LUG! LOH; JNS); "Ble" (certainly Karlskrona region; ANK, VA!). Isolated locality in Vgl: Råda, 1929 (3 specimens, NOT, coll. OLS!, 1 specimen, TBL, coll. LTH). The oldest Swedish record is from Skå Äsperöd (ZTT 1818, p. 253).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark widely distributed, both in western and southern Jylland as well as on the islands, including Bornholm (West 1940, p. 6). Absent in the entire eastern Baltic region and on the British Isles.

*Total area*: Euro-Caucasian species. In Central Europe predominantly eastern species (for instance, absent in southwestern Germany; HOR 1941, p. 70), west as far as Holland (EVS, E.B. 1908, p. 101) and Paris region (only 1 specimen; DEV 1935, p. 19); south as far as southern Italy (LUI 1929, p. 44), Greece (OTZ 1886, p. 205). In the northeast as far as eastern Prussia (HOR, l.c.), Galicia (LMN 1913, p. 53), and Slovakia (ROU 1930, p. 103); absent in the European part of Russia. The Caucasus (SDR and LDR 1878, p. 64).

## Ecology

Like *rufescens*, a pronounced forest species, but requires less humidity. Occurs quite predominantly in beech forests, but not at home in the darkest places, which are barren during summer; occurs in more open places where the sun is not completely shut out, for instance, clearings and forest fringes. Especially under moss and bark of stumps and larger trees. Less often in mixed deciduous forests or more or less pure stands of *Carpinus* and *Ulmus*; quite

sporadic in coniferous forests planted in Skå. A distinct layer of humus is always present, frequently on gravelly soil; contrarily, the soil moisture need not be high. Often gregarious. In Central Europe also predominantly in beech forests (numerous records); there are only solitary records from spruce and pine forests (E.B. 1927, p. 44; GRD 1937, p. 38; HOR 1941, p. 70).

### Biology

Distribution of dated Swedish specimens: IV: 2; V: 5; VI: 21; VII: 31; VIII: 17; IX: 5; X: 6; XI: 5. Immature beetles, June 25 and July 12 (Skå). In Denmark numerous larvae found partly in October and December, and partly from February to the beginning of June (LRS 1939, p. 317). Autumn breeder, hibernating almost exclusively in the larval stage (l.c., p. 361).

### Dynamics

In Central and southern Europe (north as far as Bohemia) this species exhibits wing dimorphism (BNN 1925, p. 329). In our region contrarily seems to be constantly macropterous, and the wings are comparatively far better developed than in either of our other species of *Leistus*. The beetle is therefore certainly capable of flight. Dahl (1928, p. 36) reports of one (probably drifted) specimen at the seashore. Additionally, the related species *spinibarbis* Fbr. has been documented in southern Europe as an excellent flier (C.C. 1926, p. 269). In Germany *rufomarginatus* is definitely in the process of extending westward (HOR, E.B. 1938, p. 129).

### \**Licinus depressus* Payk.

#### Distribution

*Sweden*: More widely distributed only on Öld and Gtl and the Mälars region, and locally frequent. Remaining localities quite scattered, and their solitary records mainly from olden times. Skå Kullen (Boh 1863, p. 66; THS 1867a, p. 52), July 1867 (Roth, ML!); Båstad, July 1868 (VNS, HM!); Årup (GAD, E.T. 1881, p. 211). Ble (certainly Karlskrona region; ANK, 3 specimens, VA!). Hll "Southern Hll" (certainly Edenberga region; MRT, MG!); Släp (several collectors!), lastly 1910 (SLL, VA!). Vgl Göteborg in 1840's (EKB, 2 specimens, MG!), 1868 (MRT, according to manuscript by SDN). Boh Solberga, Brattön, July 1943 (LDN). Små Kalmar region (several older collectors! Ögl Kudöy (ADZ, 1 specimen, MS!); Norrköping, Bjärby, April 12, 1 specimen, Lindö, April 19, 2 specimens, 1924 (WSJ!). Delimiting localities of the Mälars area; Sdm Södertälje, 1943 (OLS); Åsgård (PST, SU!); Vst Arboga (KST, according to KLF); Kungsör, 1936 (LTH); Strömsholm, 1936 (LTH); "Vst" (certainly Västerås region; JHN in litt.); Upl Uppsala (several collectors!),



lastly 1926 (LTH); Vaddö, Elmsta, 1936, 1 specimen (LTH).

*Norway:* Only a few localities in the southeast. 2 Oslo region, several localities (SIE 1875, p. 102; SHY 1879, p. 20; MO!); Norderhov (SIE, l.c.). 3 Tofteholmen and Brevik; Langesund, May 9, 1903 (STE, MO!). 4 Kragerö and Homorsund.

*Finland:* Found only in the extreme southwest, very rare. Al Eckerö (Tuomikoski, MH!); Geta (PPP, MH!); Kökar, August 7, 1941 (LBG!). Ab Kustö (SBJ 1873, p. 124; MH!).

Doubtful: Ka "Viborg?" (Silvenius, according to SBJ 1897, p. 46; MH!).

*Russian sector:* Absent.

*Adjacent regions:* In Denmark very rare, found only on Sjaëlland, Møen, and Bornholm (West 1940, p. 23). In Estonia only on the northern coast and on Ösel (HAB in litt.). Latvia (LCK and MIK 1939; LCK in litt.). Leningrad region (MAS 1902). British Isles, only England (Joy 1932, p. 345).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1919, p. 106), northern Italy (LUI 1929, p. 87), Bosnia (APF 1904, p. 162), Transylvania (PTI 1912, p. 24). The Caucasus (RTT 1900, p. 150; JAC 1905–1908, p. 309). Western Turkestan (HEY 1880–1881, p. 23). Siberia, as far as Altai (HEY l.c.; JAC l.c.)

### Ecology

533 A xerophilous species. It lives on gravelly soil (often mixed with sand or loam) with a slight admixture of humus and short but not too thick vegetation, usually consisting of grasses. It tolerates at most the moderate shade of deciduous trees or shrubs. On Öld and Gtl occurs especially in grass-rich places of the Alvar†. Also found in gravel pits. Always solitary. The species is not adverse to culture; near Uppsala and Stockholm it occurs constantly in the outer parts of the city, where it is often seen on the roads. Probably soil desiccation as a result of artificial drainage has proved favorable. It is possible that the species requires limestone or at least is highly favored by it (also according to SHY 1879, p. 20; FWL 1887, p. 31).

### Biology

Distribution of dated Swedish specimens: IV: 15; V: 9; VI: 12; VII: 26; VIII: 16; IX: 17; X: 7; XI: 1. Numerous immature beetles collected between July 14 (Öld) and August 13 (Gtl). In Central Europe larvae have been observed in June (BLK 1925, p. 23; BUR 1939, p. 161). Hibernation takes place in the adult stage. JEA (1941–1942, p. 989) assumes from the general structure of

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



*Licinus* larvae that they feed on snails, which has also been recorded for the mature beetles of another species, *oblongus* Dej. (l.c., p. 998).

### Dynamics

Wings reduced to a small scale that reaches about one-fourth the length of an elytron; the elytra seem to be fused anteriorly along the suture. Thus the insect is totally soil-bound. But in unwooded regions capability of dispersal is not altogether poor because of its marked vagility.

\**Loricera pilicornis* Fbr.

(*coerulescens* L. sec. Csiki, Cat. Col., p. 433)

### Distribution

*Sweden*: Distributed throughout the country continuously and without gaps, and also in the lower fjeld regions. Northernmost locality: Tol Karesuando (ZTT 1828, p. 12), 1935, 7 specimens (BRC, RM!).

*Norway*: Except for the actual fjelds distributed continuously and without gaps throughout the country. Northernmost locality: 37 Honningsvåg (STA).

534 *Finland*: Except for the high fjelds, universally distributed, also on the Arctic Sea coast in the Petsamo region.

*Russian sector*: Absent on the northern coast of the Kola Peninsula but along the southern coast occurs east as far as Lv Tetrina (LEV, MÅ!). In Karelia certainly found everywhere but to date not recorded from the central parts.

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 8). Estonia, including Ösel (HAB in litt.; Palm!); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 330), also Ireland (JHS and HLB 1902, p. 562). Shetland (West 1930, p. 74). The Faeroes (West 1930, p. 10).

*Total area*: Circumpolar species. In Europe south as far as northern Spain (FUE 1918, p. 48), southern Italy (LUI 1929, p. 51), northern Yugoslavia (APF 1904, p. 66). In the northeast as far as Kanin (PPP 1909, p. 5) and Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306). Iran (Bod 1927c, p. 47). Siberia (among others, SBJ 1880, p. 9) east as far as Lena (PPP 1906b, p. 25), Kamchatka (BNN, NET, SBR 1929, p. 2) and Ussuri (MDL 1931, p. 3). North America (Leng 1920, p. 46).

### Ecology

A riparian species that requires wet, soft soil with bald patches and more or less marked shade of trees, shrubs, or tall ground vegetation. Usually occurs on small bodies of stagnant water (ponds, puddles, ditches, forest swamps),

often containing dirty, foul-smelling water, for instance, rubbish heaps. It is therefore favored to some extent by culture. Generally the shore material apparently contains disintegrating organic substances; the species completely avoids pure gravel or sand, but prefers loam and gytja†, and is also found on peat. In autumn the species, like most riparian carabids, somewhat retreats from the water in search of drier winter quarters; but I find no justification for Dahl's statement (1928, p. 41) that it changes habitat at different seasons of the year "more than other ground beetles". Other ecological observations from Central Europe accord with my experience. In the fjelds the species regularly reaches the *reg. bet.* (also on the Kanin Peninsula almost until the timber line; PPP 1909, p. 5) and has occasionally been found (possibly accidentally) in the lower *reg. alp.* in Hjd, Jtl, and Tol.

### Biology

- 535 Southern Swedish catches: II: 1; III: 7; IV: 25; V: 71; VI: 92; VII: 55; VIII: 41; IX: 22; X: 8; XI: 3; XII: 1. In Denmark maximum abundance already in May; numerous larvae found from June to the end of September, and one at the end of April. LRS (1939, pp. 319, 366) concludes that hibernation normally takes place in the adult stage and only in rare, exceptional cases in the larval stage. This is also true for Sweden where numerous immature beetles were observed between July 16 (Dsl) and August 15 (Sdm), August 24 (Lul), and one even in May 1934 (Ögl Motala).

### Dynamics

Wings fully developed and the insect is a good flier. Spontaneous flight observations: Skå Lund, April 13, 1925 (ADR!); Stockholm, April 30, 1937 (LTH); Nbt Över-Torneå, June 8, 1930 (LTH); also in Central Europe (LTZ 1847-1852, p. 132; GRD 1937, p. 76). In Finland numerous specimens found in sea drift (Frey 1937, p. 436; PME 1944, p. 37).

### Fossil Record

Denmark, postglacial (HNR 1933, p. 126).

*\*Masoreus wetterhalli* Gyll.

### Distribution

*Sweden:* Apparently continuously distributed in Skå and along the southern parts of the eastern and western coasts. Highly local. Inland records only from

† (cf. page 69; suppl. scient. edit.).

Skå: Fågelsång (THS, ML! MG! LU!); Södra-Sandby, Skatteberga, 1936, numerous (LTH); Revingehed, 1938, 4 specimens (HZE!); Sjöbo, 1867, 1888 (Roth, ML! HM!); Ilstorp (THS, MB! Roth, MG! HM!). Hill Halmstad, repeatedly found but rare (E.T. 1915, p. 94; FGQ, E.T. 1922, p. 192!); Falkenberg, estuary of Suseån, June 3, 1935, 6 specimens (Palm); Varberg, Apelvik, on the sea (AUR, E.T. 1907, p. 128; RM!). Ble Torhamn, June 23, 1924, 1 specimen (BRD!); Små Våxtorp, Ekenäs, 1 specimen (WLN, LG!). On Öld and Gtl widely distributed, also on Sandön (JNS 1925, p. 70!), August 1931, 2 specimens (LOH!).

Doubtful: Skå Hästveda (MLG 1863, p. 44).

Absent in the rest of Fennoscandia. The old record from Norway has to be rejected (MST, N.E.T. 1933, p. 271).

536 *Adjacent regions:* In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 46). In Estonia, two localities: Dorpat, 1834, (SDL 1872); Petseri (COL, coll. STK). Latvia (SDL 1872; LCK and MIK 1939). Not known in the Leningrad region, to the best of my knowledge. British Isles, only England (ooy 1932, p. 369).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 203). Corsica (DEV 1935, p. 57), southern Italy, Sardinia, Sicily (LUI 1929, p. 136), Greece (OTZ 1886, p. 212). Northern Africa (BED 1895–1914, p. 228). Canary Islands (JEA 1941–1942, p. 1015). Iran (OD 1927c, p. 65). The Caucasus (SDR and LDR 1878, p. 66). Kirgizia and western Siberia (HEY 1880–1881, p. 21).

### Ecology

Predominantly a xerophilous species that lives in open, sun-exposed places, mainly on sand (less often gravel) with a slight admixture of humus. Found in particular on the sea, for instance, on arrested dunes, more rarely on sandy fields inland; also on the Alvar† of Öld. It requires vegetation that is continuous at least in patches, but sparse and usually low, and of the xerophilous type, e.g., *Thymus*, *Galium verum*, *Artemisia campestris*, and sometimes *Calluna*. Successive species include, for example, *Harpalus anxius* and *smaragdinus*, *Calathus mollis*, *Metabletus foveatus*, and in Central Europe also *Cymindis macularis* (LTZ 1885–1892, p. 42). In Central Europe always on dry, open sandy soil, especially on the coast, among *Calluna*, *Corynephorus*, and *Hieracium pilosella* for example (GRH 1910, p. 32; Dahl 1928, p. 185).

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

## Biology

Distribution of dated Swedish specimens: II: 4; III: 1; IV: 1; V: 2; VI: 32; VII: 51; VIII: 28; IX: 14. Immature beetles in June and July 6 (Öld). In Denmark the conditions are different only to the extent that the beetle is somewhat more frequent already in May, but here too maximum abundance in July. LRS (1939, pp. 346, 424) concludes that breeding takes place in spring, and hibernation in the adult stage. But in my opinion this species, like the ecologically closely related *Olisthopus*, is an autumn insect that hibernates in the larval stage and only to a small extent as adult.

## Dynamics

537 Wing dimorphism evident. It is designated "aile" in France (JEA 1941-1942, p. 1015), but to date I have only seen one fully-winged specimen (certainly also capable of flight) from Denmark, Silkeborg. All the Swedish specimens examined by me have wings reduced to a small scale, barely visible to the naked eye.

*\*Metabletus foveatus* Fourc.  
(*foveola* Gyll.)

## Distribution

*Sweden*: In southern and central Sweden widely, continuously, and probably uninterruptedly distributed. The species might possibly occur in Dsl, but it is conspicuously absent on Gtl. The northern limit is rather sharply marked by the following localities: Vrm Årjäng, May 1937 (RGS!); Kristinehamn, April 26, 1943 (WRN); Degerfors, June 12, 1936, 4 specimens (LTH); Nke Almby, repeatedly found (JNS!); Sdm Äsgård (ERC, MG!); Upl Hjalsta, April 5, 1927 (GTZ!); Uppsala (several collectors!); Grisslehamn, June 24, 1936, 1 specimen (LTH); Forsmark, June 26, 1936, 1 specimen (LTH).

Erroneous: Lapland (GLL 1896, p. 7).

*Norway*: Only two localities in the southeast on the Swedish border; 1 Hvaler (N.E.T. 1920, p. 60; MO!); Halden (N.E.T. 1922, p. 119).

Erroneous: Oslo region (SIE 1875, p. 93; according to MST, N.E.T. 1920, p. 60).

*Finland*: Found many times on Åland (several collectors! among others, S.H.A. 1937, p. 105). In the mainland found in two small, widely separated regions; extremely rare. Ab St. Karnis (KNG), St Yläne (SBC 1834, p. 271; SBJ 1873, p. 96; 1 specimen, MÅ!). Ik Pyhäjärvi (SBJ, MH!); Kivennapa, 1934 (KRG, coll. SAR!).

*Russian sector*: Only three localities in the extreme south (Sv); Nurmoila, 1943 (PFF); Gumbaritsa, June 1942, 1 specimen (PME!); Vaaseni, May 28,



1896, 1 specimen (PPP 1899a, p. 12).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 50). Not known from Estonia; on the other hand found in Latvia (SDL 1872; LCK and MIK 1939). Leningrad region (OBT 1876; BSK 1925). British Isles (Joy 1932, p. 373), also Ireland (JHS and HLB 1902, p. 592).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1921, p. 209), southern Italy, Sardinia, Sicily (LUI 1929, p. 140), Greece (OTZ 1886, p. 213) East as far as Ural (JAC 1905–1908, p. 401). The Caucasus  
538 (SDR and LDR 1878, p. 65; JAC l.c.). Siberia, east as far as Amur (HEY 1893, p. 28; JAC, l.c.).

### Ecology

Markedly xerophilous. Always on open, sun-exposed sand or gravel with sparse vegetation that is very low or present only in patches, consisting of grasses, *Calluna*, *Thymus*, *Scabiosa arvensis*, and similar plants. Often occurs in the vicinity of the sea but not on loose, barren quicksand. Also found in sand pits. Repeatedly detected on the Alvar† of Öld, which contradicts its assumed aversion to limestone (Dahl 1928, p. 193); the absence of this species on Gtl is certainly due to ecological reasons of dispersal and not of existence. In the rest of the Europe it is a true sand animal. In Holland it occurs regularly with *Formica sanguinea* Latr. (RCL, E.B.H. 1926, p. 129), which has never been observed in our region.

### Biology

Swedish catches: I: 1; II: 1; III: 3; IV: 15; V: 42; VI: 42; VII: 29; VIII: 31; IX: 15; X: 2; XI: 1; XII: 1. In Denmark declines notably in July–August (LRS 1939, p. 347). Immature beetles found in July and August and on August 19 (Ble). Spring breeder, hibernating as an adult.

### Dynamics

This species seems to be constantly short-winged. In all the Fennoscandian specimens examined by me, the wings are reduced to an extremely small scale not visible to the naked eye. However, in sandy, nonwooded regions the species has a fair capability of dispersal due to its marked mobility.

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

*\*Metabletus truncatellus* L.

Distribution

*Sweden:* From Skå to the Finnish border distributed continuously and without gaps, but north of latitude about 62° N found only in the central region. Found in all provinces except Hjd. Northernmost or highest localities are: Elr Transtrand, 1937 (RGS!); Mora, 1937 (KLF); Hls Los (SJB); Ramsjö, 1943 (LDN); Jtl Ragunda (FRI, 6 specimens, VA!); Bispgården, 1930 (LTH and Palm, 1934, p. 42!); Ång Långsele, 1930 (LTH and Palm, l.c.); Mo, Moliden, 1939 (BRC, RM!); Nyåker (PST, MG!); Vbt Hällnäs, Bodarna, 1935 (HEQ!); Kusfors 1930 (LTH and Palm, l.c.); Lyl Sikselberg, 1943, 1 specimen (HEQ!); Nbt Edeforsen and Harads, 1938, frequent (LTH); Över-Kalix, Lomträsk, 1938 (LTH); Korpilombolo, Narken, 1938 (LTH); Lul Pålkem, June 1941 (WRN!).

*Norway:* Occurs throughout the southern coast from the Swedish border as far as 5 Sogndal (HLS 1915, p. 33); and 6 Strand in Ryfylke (HLS, l.c.). Inland, extends as far as latitude 62° N; 24 Lågendalen near Dovre. Additionally four localities on the inner part of Sogne Fjord (19): Lærdal; Årdal; Fortun; Lyster.

*Finland:* South of latitude 65° N certainly universally distributed; insignificant gaps in parts of Tb and Kb are only apparent. In the coastal region reaches the Swedish border. Northernmost localities: Ok Ruhtinassalmi (SSK, MÅ!); Ob Pudasjärvi (NSL); Kemi (EHN, MÅ!). In the north isolated near Lk Muonio (SBJ 1873, p. 96; "Lapponia," ASP and SBF, MH!).

*Russian sector:* To date recorded only in southern Karelia, several localities (several collectors!), north as far as Kn Semsjärvi, 1942 (CRP!).

Doubtful: "Lapponia Rossica" (SBJ 1900b).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 50). Estonia, including Ösel (HAB 1936a and in litt.; SAA!); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 373), in Ireland very rare (JHS and HLB 1902, p. 592; OMH 1929, p. 24).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1921, p. 208), southern Italy, Sardinia (LUI 1929, p. 140), Bulgaria (APF 1904, p. 327). The Caucasus (SDR and LDR 1878, p. 65; ECH 1930a, p. 149). Siberia (among others, SBJ 1880, p. 23), east as far as Lena (PPP 1906b, p. 65) and Amur (BOD 1927b, p. 66).

Ecology

Compared with *foveatus*, this species is very eurytopic and not markedly xerophilous. It indeed often lives together with that species on open sandy and gravelly soil, but is absent in the driest, most barren places, where *foveatus* may be frequent. Usually on meadow soil and cultivated soil with more or less continuous vegetation, even in sparse dry forests. Its dependence on soil

conditions is minimal and sand- and gravel-mixed soil, loam, humus, and even peat suffice, if the surface is somewhat dry. Markedly heliophilous.

### Biology

- 540 Southern Swedish catches: I: 3; II: 4; III: 14; IV: 36; V: 49; VI: 80; VII: 24; VIII: 25; IX: 19; X: 8; XI: 8; XII: 1. One immature beetle found on August 15 (Små). In Denmark maximum abundance already in April (LRS 1939, p. 346). Spring breeder, hibernating as an adult.

### Dynamics

Wing dimorphism evident. In the macropterous form, which is very rare, the wings fully developed and certainly functional. The species has been found, among others, in sea drift in Finland (Frey 1937, p. 437! PME 1944, p. 39). In brachypterous specimens the wings are reduced to a scale not visible to the naked eye.

*\*Microlestes maurus* Sturm.

### Distribution

*Sweden*: Only on GtI moderately distributed, north as far as Fårösund (JNS!). Otherwise only scattered localities in southern Sweden: Skå Fågelsång, September 13, 1925, 1 specimen (BRD!); Ven, August 27, 1939, 1 specimen (HZE!); Hälsingborg, Råå (VNS, E.T. 1920, p. 164; 1 specimen, VA! 1 specimen, coll. JNS!), Hll Halmstad (HRM, 2 specimens, ML!); Släp (SDN, 2 specimens, MG!). Vgl Kinnekulle, June 1939, 1 specimen (JNS!). Små Kalmar (WLN, LG! WRN!). Öld (BOH, 1 specimen, RM!). Södra Möckleby, June 24, 1928, 2 specimens (LOH, coll. JNS!); Halltorp (JNS!); MU! coll. JNS!), August 22, 1930 (GTZ!).

Absent in Norway (see MST, N.E.T. 1921, p. 99; 1933, p. 271).

*Finland*: Only one locality in the extreme southeast: K1 Salmis, under the bark of a fallen *Populus tremula*, 1938, 1 specimen (PME, S.H.A. 1938, p. 264!).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed, both in Jylland as well as on the islands (including Bornholm), almost frequent (West 1940, p. 50). Estonia, to date only two localities: Wormsö, June 5, 1922 (LBÄ!); Petseri (COL, coll. STK!). Not known from Latvia and Leningrad region as far as I know. British Isles, only England (Joy 1932, p. 373).

*Total area*: Western Palearctic species. In Europe south as far as Portugal (FUE 1921, p. 211), southern Italy (LUI 1929, p. 141), Greece (APF 1904, p. 332). East as far as southern Russia (HDH 1912, p. 51). Asia Minor (HDH, l.c.). Syria and Cyprus (HDH, l.c.). The Caucasus (CHD 1846, p. 60; SDR and



- 541 LDR 1878, p. 65). Western Turkestan (HEY 1880–1881, p. 18; not included by HDH, l.c.). The record from western Siberia is erroneous (SBJ 1880, p. 23; = *minutulus*, MÅ!).

### Ecology

In our region this species seems to have exactly the same mode of life as *minutulus*. Thus it is found on dry, usually loamy and gravelly soil in sun-exposed situations and with sparse vegetation of grasses and herbs. In the rest of the Europe likewise found in similar biotopes (West 1940, p. 50; FWL 1887, p. 145), for instance under *Sarothamnus* (S.E.Z. 1915, p. 214), and also at the base of trees (B.E.Z. 1862, p. 276); these, however, purportedly constitute winter refuges (LRS 1939, p. 426). Its assumed halophily (Dahl 1928, p. 195) is certainly fictitious; contrarily, its possible dependence on limestone deserves investigation.

### Biology

Distribution of the very few dated Swedish specimens: V: 5; VI: 12; VII: 0; VIII: 3; IX: 1. In Denmark, where there is rich material, the disappearance during midsummer is likewise very pronounced (LRS 1939, p. 347). It is a spring breeder, hibernating as an adult (l.c., p. 426).

### Dynamics

Wing dimorphism evident (HDH 1912, p. 50). In brachypterous specimens the wings have a reflexed apical part but are at most, equal in width and scarcely longer than an elytron, and hence useless for flight. Macropterous specimens are fully winged and certainly capable of flight; however, flight observations absent to date.

\**Microlestes minutulus* Gze.  
(*glabratus* Dft.)

### Distribution

- Sweden*: Found in the coastal region of the southeast, and in an isolated region on both sides of lake Vätter. I. Northernmost localities of the southern area in the mainland: Skå Hälsingborg, Raus, 1942 (PLQ!); Hll Halmstad region, 542 1 specimen, Vapnö, 1918, 1 specimen (FGQ!); Små Hagby, 4 specimens (coll. THS, ML!); Kalmar, at least since 1871 (several collectors!); Mönsterås (HGL, coll. JNS!). On Öld and especially on Gtl more widely distributed, north respectively as far as Öld Hornsjön (1 specimen, WRN!), 1920, 2 specimens (JNS 1922!), and Gtl Fårön, 1901 (O. Lindbom!); 1927 (LOH, coll. JNS!). II.



Ögl Omberg region, 1927–1935, found many times and often in large numbers (Palm, E.T. 1931, p. 35! LOH!); Motala, Karlsfrid, gravel pit, April 14, 1933, numerous (LTH). Vgl Hjo, bank of Vätter, June 6, June 7, 1936, 3 specimens (LTH); Dagnäs, Hornborgasjön, June 1939, 1 specimen (JNS!).

*Norway:* No records.

*Finland:* In the south rather widely distributed but apparently with a gap on the southern coast, as a result of which there are two subareas. I. In the southwest. Al Sottunga, 1942, 3 specimens; Kökar, 1941, 1942, several specimens (LBG!); Ab Nagu (Sundberg, MH)!. In the mainland several localities, north as far as Ab Nådendal (Leino 1938); Ka Hattula (several collectors); east extends into Helsinki region (several collectors!). II. In the southeast: west as far as Ka Viborg (STN!); Sa Joutseno (BLQ); north as far as Kl Parikkala (SBJ 1881, p. 221; MH!); Sa Punkaharju (KNG); Kl Salmis (N.E. 1939, p. 131). Also in Tytärsaari in the Gulf of Finland (HLL).

*Russian sector:* Four localities in southern Karelia: Sv Gumbaritsa, 1943 (PFF!); Vaaseni (KRV!); on Swir River (PPP 1899a, p. 12). Ko Derevjannoje, 1942 (SAA!).

*Adjacent regions:* In Denmark much rarer than *maurus*, found in southern and eastern Jylland, and on Sjaëlland (one locality) and Bornholm (West 1940, p. 50). Estonia, on the coast, including Ösel (HAB 1936a and in litt.), inland near Petseri (COL, coll. STK). Latvia (SDL 1872). Leningrad region (OBT 1876; HDH 1912, p. 28), Lempaala, 1943 (PHJ). Absent on the British Isles.

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 58), central Italy and Sicily (LUI 1929, p. 140). Yugoslavia (HDH 1912, p. 28). East as far as Astrachan (HDH, l.c.). The Caucasus and western Turkestan (HDH, l.c.). Siberia (HDH, l.c.; SBJ 1880, p. 23, "*maurus*"; MÅ!). Records from the more southern regions have not been recognized by HDH (l.c.), nor the occurrence in North America (still included by Leng 1920, p. 66).

## Ecology

On open sandy or gravelly (also somewhat loamy) soil that is often quite dry. The species, however, is not as xerophilous as *Metabletus foveatus*. Vegetation always sparse but not always as low, yet sometimes (on gravelly soil) negligible. Often found in gravel pits. Notably heliophilous. This species also hibernates, often gregariously, in moss and under bark at the base of trees (Palm, E.T. 1931, p. 35; WLK 1867, p. 6; E.N. 1886, p. 11). In the rest of Europe the species' mode of life is much the same as in our region (West 1940, p. 50; GRD 1937, p. 50), but also found under *Sarothamnus* (S.E.Z. 1915, p. 214). In Holland purportedly found together with ants (E.B.H. 1926, p. 129).

## Biology

Distribution of dated Swedish specimens: III: 3; IV: 19; V: 66; VI: 33; VII: 5; VIII: 9; IX: 7; X: 10; XI: 5. It is thus a very pronounced spring animal. Immature beetle, August 9, 1936 (Skå Kungstorp). Copulation observed on May 9, 1940 (Gtl Visby). Spring breeder, hibernating as an adult. In captivity feeds on dead conspecific individuals (Gtl Visby).

## Dynamics

Wings constantly fully developed. One beetle, May 31, 1940 (Gtl Ire), induced to flight upon exposure to sun under glass. Numerous specimens found in sea drift on Öld (Byerum, June 5, 1943, BRK!) and in Finland (Frey 1937, p. 437; STÅ 1938, p. 19; PME 1944, p. 39).

### *\*Miscodera arctica* Payk.

## Distribution

*Sweden:* Northern species distributed, nonetheless, almost throughout the country. South of latitude about 62° N very rare and found singly almost without exception, often after a fruitless search for many years. In Mdp, Ång, and central Jtl a gap seems to occur; it has never been found, for instance, in the often explored region of Åre. Localities in southern and central Sweden (with only one specimen unless otherwise mentioned): Skå Ringsjön Råröd, June 1891 (coll. MLC, HM!); Vittsjö, June 1890 (VNS, 2 specimens, ML! Undated, in coll. RGS!). Hll Laholm (according to BRD 1934, p. 220); Fjärås, May 16, 1910 (SDN manuscript; ERC, without year, 4 specimens, MG!); Släp (SDN manuscript). Små Ryssby, June 28, 1923 (GTZ!); Burseryd, Hällabäck, May 29, 1936 (LTH); Kristadala, Hummeln, June 23, 1932 (LOH!); Jönköping, 544 Råslätt (GAD, E.T. 1881, p. 211). Gtl Öja, July 27, probably 1848 (P. Lovén, according to BOH 1849, p. 198; RM!); Fårön, seashore (MJB 1905, p. 32). Vgl, several localities in Göteborg region, but always only singly, and lastly near Landala, April 1923 (LTH); Håcksvik, Spaden, May 29, 1936 (LTH); Tidaholm (GAD, E.T. 1881, p. 211); Bäreberg (FGQ); Skara (HCK, VM). Boh Orust, Lilla-Hasselön (KLF). Dsl Bengtsfors, June 24, 1943 (BGW). Ögl Höbgy, Lärketorp, August 16–September 18, 1813, numerous (ZTT 1828, p. 40; 1840, p. 45); Borensberg, June 5, 1929 (GTZ!). Nke Åsbro (JNS). Sdm Stjärnhov, 1941 (by K.E. Johansson!). In the Stockholm region several localities, always found singly. Upl Uppsala region, among others, April 28, 1900, June 9, June 25, 1907, June 20, 1908 (RMN, RM! CDG, SJB). Vst Västerås, 1909 (SLL, VA!). Vrm Arvika, July 2, 1933, 2 specimens (LTH). Dlr Falun (Aspman, according to KLF); Leksand (SPB!). Hls Hornslandet (WNG, according to THS 1868, p. 292).

*Norway:* Chiefly in the fjelds and the high north; in the coastal region of the south only single specimens; 1 Hvaler, Kirkeøy, May 1926 (MST); Hoffsrød, Idd, July 15, 1925 (N.E.T. 1926, p. 158). 2 Oslo, Tøien (SIE 1875, p. 90). 4 Lillesand, May 30, 1923 (N.E.T. 1923, p. 255). 19 Feios (MST). The species is apparently bicentric; it is absent throughout the Trondheim region, and the gap between 25 Røros region (MST) and 30 Hattfjelldal (SPS 1902, p. 12) covers almost 3° of latitude. North of latitude 68° N found everywhere; also on the coast, north as far as 37 North Cape (SIE, l.c.).

*Finland:* Distributed rather evenly throughout the country but in the south occurs only sporadically. On Åland only one specimen near Hammarland (MER, MÅ!); likewise in Hogland in the Gulf of Finland (KRG). In Ob province a gap occurs but it is not certain whether a similar gap exists on the southern coast between NI Kyrkslätt (SBJ 1873, p. 92) and Ka Virojoki (PFF).

*Russian sector:* In the Kola Peninsula scattered localities, east as far as Lj Ponoj (PPP 1905, p. 88; MH!). In Karelia found only near Kn Karhumäki, 1943 (KRV) and Sv Gumbaritsa, 1942, 2 specimens (PME!); Uslanka, 1943 (PFF).

*Adjacent regions:* From Denmark only 3 specimens known: two localities in northern Jylland, one locality on Bornholm (West 1940, p. 11). Estonia, only near the Baltic port (SDL 1872, 1891); Latvia, three localities (MIK 1905, LCK in litt.). Leningrad region (OBT 1876; BSK 1925), also near Lempaala, 1943 (PHJ). British Isles (Joy 1932, p. 331).

*Total area:* Circumpolar species. In Europe almost boreo-alpine. In the  
545 northern German plain rare (sometimes in large numbers but extremely local), west extends into the Lüneburg heath, south as far as Upper Silesia (HOR 1941, p. 111). Isolated in the Alps of Tyrol (HOR, l.c.; LUI 1929, p. 57) and in Switzerland (according to HOR, l.c.). In the northeast as far as Pechora (PPP 1907c, p. 308). Siberia (among others, PPP 1907d, p. 5), east at least as far as Lena (PPP 1906b, p. 26). North America, widely distributed (Leng 1920, p. 68).

### Ecology

Almost stenotopic on very stony moraine soil with a strong admixture of fine sand. The species requires some (albeit slight) surface humidity and prefers somewhat shaded places. Hence it is found at forest fringes, in sparse pine heath, gravel pits, etc. Vegetation comprises *Calluna* or *Empetrum* with intervening bald patches overgrown with only the finest moss. Rather regular successive species (at least in the northern forest region): *Trichocellus cognatus*, *Bembidion grapsei*, *Cymindis vaporariorum*, *Amara quenseli*, but especially the obligate species *Byrrhus fasciatus* Forst. and/or *Cytillus sericeus* Forst. The species attains maximum frequency in the upper parts of the coniferous for-



est region and in the *reg. bet.*, but is also a native of the lower and middle parts of *reg. alp.*, especially in the *Empetrum*-rich dwarf shrub heaths (LBÅ 1927, p. 8; BRD 1934, p. 74), and regularly reaches an altitude of more than 1000 m above sea level (BRD l.c.; LTH 1935a, p. 39); also found in the tundra of the Kola Peninsula (PPP 1905, p. 88). In Central Europe it is alpine and (in northern Germany) also occurs in sandy pine heaths (S.E.Z. 1852, p. 99; 1856, p. 188; LNZ 1879, p. 3; NBG, E.B. 1936, p. 270; GRD 1937, p. 40).

### Biology

Distribution of dated specimens from southern Scandinavia: IV: 2; V: 5; VI: 13; VII: 4; VIII: 5; IX: 5. This data does not correspond with that given by LRS (1939, p. 320). However, I assume that his heterogeneous material "from our adjacent countries" includes at least material from northern Scandinavia (p. 372), which has led him to the wrong conclusion that *Miscodera* breeds in autumn and hibernates in the larval stage. Numerous beetles have been found in northern Sweden between July 20 (Tol) and August 2 (Jtl), which unquestionably hibernate.<sup>31</sup> In northern Germany the beetle has been repeatedly found, and in large numbers, in its winter quarter (S.E.Z. 1852, p. 99; 1856, p. 188; LNZ 1879, p. 3). Since *Miscodera* constantly lives together with byrrhids (see above), it is natural to consider these its normal prey.

### Dynamics

Wings fully developed. Observations on flight absent and to imagine a flying *Miscodera* seems somewhat far-fetched. However, four specimens were found in sea drift in Finland (PME 1944, p. 37), and one on the seashore near Danzig (S.E.Z. 1852, p. 164), in addition to numerous individuals on the surface of the glacier of Tol Kebnekaise up to an altitude of 1,700 m above sea level (July 12, 1941, BGW!), where it is not possible for the insect to be native. All these specimens must be considered wind-drifted. Repeated attempts to induce the insect to flight upon exposure to sun and warmth (Tol Abisko, July 1939) proved unsuccessful.

*Molops piceus* Panz. (*terricola* Fbr.): Recorded a long time both in Sweden (PAY 1798, p. 107; GYL 1810, p. 93) and in Norway (SIE 1875, p. 95). These reports are certainly wrong (see ULL, E.T. 1899, p. 295; MST, N.E.T. 1933, p. 270).

<sup>31</sup>Yet it is quite conceivable that development in the fjelds and the high north spans a period of two years.



\**Nebria brevicollis* Fbr.

Distribution

*Sweden:* In the south, mainly in Skå, Ble, and on the west coast widely distributed and frequently very numerous. Sparser in the southern Swedish highland. Northern limit sharply marked (except for two isolated localities) and represented by the following localities: Dsl Ed, 1931, 1932 (SVS); Bengtsfors, 1933 (LTH); Vgl Kinnekulle, frequent (several collectors!); Back, Borrud, June 1940 (WRN); Hjo, 1936 (LTH); Ögl Omberg region (Palm! LOH! LTH!); Op-phem, June 1940 (WRN); Kvarsebo, Säter, June 22, 1924, 1 specimen (WSJ!). Isolated: Nke Äsplunda (RGS, E.T. 1913, p. 232; 1 specimen, coll. LTH). Sdm Södertälje, Pershagen, July 1928, 1 specimen (BRC!).

Erroneous: Lapland (GLL 1896, p. 4; see THS 1859, p. 180; MST 1918, p. 704).

547 *Norway:* Exclusively on the coast in the south and southwest. Conspicuously absent in Provinces 2 and 3 (environs of Oslo Fjord). On the Swedish border two localities: 1 Idd and Halden (HSS). Then, from 4 Kragerö (ULL) to 7 Bergen region, two localities (MST 1918, p. 704) and as far as 8 Sönd Fjord, continuously distributed and usually frequent.

Doubtful: Trondheim (SIE 1875, p. 81; STM 1877, p. 150; MST 1918, p. 704; N.E.T. 1923, p. 256; 1937, p. 144). The record from STM is based on *salina* (MST 1918, p. 705). The same is probably true of the record by SIE; the supposed voucher specimen is unlabeled (MST l.c.).

Erroneous: 37 North Cape (SIE, l.c.); undoubtedly confused with *gyllenhali* (MST, l.c.). 15 Ål in Hallingdal (STE 1898; according to MST, N.E.T. 1921, p. 88).

*Finland:* Only on Åland, but different localities and repeatedly found (SBJ 1873, p. 63; MH! MER, S.H.A. 1937, p. 105; MÅ! GBL, N.E. 1936, p. 122; WLL; HLL).

*Russian sector:* No records.

*Adjacent regions:* In Denmark found everywhere and very frequent (West 1940, p. 6). Absent in Estonia; according to ULN (1884, p. 9) in eastern Latvia; also in northern Poland (OGI 1931, p. 18). Not known from the Leningrad region. British Isles (Joy 1932, p. 327), also Ireland (JHS and HLB 1902, p. 561).

*Total area:* Western Palearctic species. In Europe south as far as southern Spain (FUE 1918, p. 43), Corsica (DEV 1935, p. 20), southern Italy, Sardinia, Sicily (LUI 1929, p. 48), Greece and Crete (APF 1904, p. 54). In Russia north and east as far as Moscow (JAC 1905–1908, p. 261). Not found in northern Africa (JEA 1941–1942, p. 193). Asia Minor (ECH 1922, p. 30; BOD 1927a, p. 45). Iran (BOD 1927c, p. 38). The Caucasus (CHD 1846, p. 107; SDR and LDR 1878, p. 63). The records from western Siberia (HEY 1880–1881, p. 13; JAC, l.c.) are erroneous (HOR 1941, p. 79).

## Ecology

An almost stenotopic deciduous forest species, requiring marked humus layer (usually on the underlying loamy soil), in addition to shade and moderate to notable soil moisture. However, it is often found in very sparse forest stands or at forest fringes, but only singly at a considerable distance from the forest (and in such cases may occur together with *salina*). It occurs especially under leaf litter, moss, and the bark of tree stumps. Ground vegetation often poorly developed, such as in beech forests. Since it is not shy of culture, it also lives  
 548 in gardens and parks. Dahl's contention (1925, p. 11; 1928, p. 32) that the species avoids humic acids and occurs only at humus-rich place neutralized by limestone does not correspond with the conditions in our region. This species lives both in limestone-rich and limestone-poor regions, and always in humus-rich places. Also in Central Europe predominantly (but perhaps not so exclusively as with us) a species of deciduous forests (see West 1940, p. 7; E.B. 1927, p. 94; GRD 1937, p. 38).

## Biology

Swedish catches: III: 2; IV: 12; V: 23; VI: 60; VII: 29; VIII: 38; IX: 18; X: 6; XI: 0; XII: 1. The sharp decline in July is difficult to understand since the highest values occur in this very month in Denmark (LRS 1939, p. 316). Numerous immature beetles found from May 16 (Vgl) to June 18 (Ble). In Denmark (l.c.) numerous larvae found throughout the winter half-year, from the beginning of September to the end of May. It is thus an autumn breeder, hibernating in the larval stage and, in our region, apparently to a greater extent than in Denmark, as an old adult (LRS l.c., p. 358). Larvae purportedly feed on larvae of other insects (also cannibalistic) (BLK 1925, p. 15).

## Dynamics

Wings fully developed. Spontaneous flight observed in the afternoon on the seashore on July 4, 44† (Boh Grebbestad, LLR!). Also the records in Germany, "in gas tanks" (CRN 1884, p. 8; see p. 15 above) and on the wall of a house in the city (DTZ 1936, p. 49), indicate flight capacity. However, the species is certainly not a regular flier.

## Fossil Records?

England, two records, respectively "Pleistocene" and postglacial (Bell 1922, p. 46). These could as readily refer to *salina*.

†(So given in the German original; should read "1884"; suppl. gen. edit.).

\**Nebria gyllenhali* Schh.  
(*rufescens* Ström sec. Jeann. 1937)

Distribution

(map in HDH and LTH 1939, p. 269, pl. VI)

*Sweden*: Northern species occurring southernmost on the shores of Vänern and Vättern and the coasts of GtL. Southern delimiting localities: Dsl Ed, shores of  
549 Stora- and Lilla-Le, 1933, numerous (LTH); Årtemark, 1933 (LTH); Bolstad, shore of Vänern, 1933, 1 elytron (LTH); Vgl Vänersborg (POR, LJ!); Råda, 1 specimen (NOT!); Kinnekulle, shore of Vänern, numerous (several collectors! Also MRT 1873, p. 9); Hjo 1941, 3 specimens (BRD!); Små Jönköping (leg. ?, MG!); Ölmestad 1916 (J.A.Z. Brundin!); Gränna (Lundbom, coll. GTZ!); Ögl Omberg, 1884, 1930, 1931 (MRT, MG! Palm!); Motåla, Råsnäs and Norra-Freberga 1933 (LTH); Västra-Ny, 1852 (HGN 1853, p. 15); Vst Klotten (Palm!); Dlr Folkärna, Brunnbäck, on the river, 1933, 3 specimens (KLF); Hls Ljusne, on the river, 1936, 1 specimen (LTH). GtL Västergårda, 1867 (BOH 1867, p. 615); Visby region, numerous (several collectors!); Irevik and Lickershamn 1934, Kapellshamn, 1927 (LOH!); Fårön (several collectors! Also MJB 1905, p. 81).

Doubtful: Vgl Skara (GAD) and Stenum, 1880 (Lundberg) (coll. Roth, ML!). Certainly from the shore of Vänern.

Erroneous: Skå (WLG 1866, p. 5; no voucher specimen).

*Norway*: Distributed throughout the country continuously and without gaps, but on the southern coast only solitary records, southernmost near 5 Kristiansand (ULL 1899, p. 294). In the north as far as 37 North Cape (according to STA).

*Finland*: Three different areas. I. In the southwest: Al Eckerö, 1922, 1 specimen (LBÅ 1924a, p. 30; MH!); Hammarland (several collectors!). Ab Pargas (REU, MH!); Hitis (Hoffström, according to WEG). II. In the south-east widely distributed, west as far as Hogland in the Gulf of Finland (several collectors!); Ta Asikkala (HLM, coll. NUM and STK); Padasjoki (EHN, MÅ!); Tb Jyväskylä (SAA! STK); Saarijärvi, Pyhähäkki, 1943 (KRG); north as far as Sb Kuopio (LEV, MH! STN!); Kb Juuka, Halivaara (KRG! Nurmest (SBJ, MH!). III. North of latitude 66° N widely distributed and often frequent. Southernmost localities: Ob Kemi (SBJ, MH!); Rovaniemi (LBG! STN!); Ks Kuusamo (LBG! STN!).

*Russian sector*: On the Kola Peninsula found everywhere (PPP 1905, p. 85!). In Karelia near Kk Soukelo (PPP l.c.; MH!) and at four localities in the south between Kr Suma (ENW, MH!) and Ko Petrosavodsk, 1942 (KNG!).

*Adjacent regions*: Absent in Denmark. In Estonia numerous localities but only on the northern coast (SDL 1891; LBÅ 1934; HAB in litt.). In Latvia two localities on the coast, the others on the Düna River and the Livländian Aa (SDL 1891; LCK in litt.). Leningrad region (OBT 1876). British Isles (Joy



1932, p. 327), also Ireland (JHS and HLB 1902). Shetland and the Faeroes (West 1930), Iceland (LTH 1931).

550 *Total area:* Circumpolar species. In Europe boreoalpine species; in Central Europe exclusively found in the mountains, from the Sudetes in the north as far as Pyrenees, high Apennines, northern Albania, and Bulgaria in the south (HDH and LTH 1939, p. 132). In Russia south at least as far as Yaroslav (SEM 1898, p. 79), northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306). All of Siberia (BNN 1925, pp. 261, 279; HDH and LTH, l.c.). North America, widely distributed (BNN l.c.; JEA 1937, p. 4). Greenland (HNR and LBK, 1917, p. 484).

### Ecology

In the *reg. alp.* of the fjelds (as in Iceland; LTH 1931, p. 165) occurs almost ubiquitously on moderate to very moist soil (see also SPS 1879b, p. 13). In lower places a stenotopic riparian species, found at lakes, rivers, and brooks with cold and clear water; also occurs at the sea (in Norway south at least as far as Bergen; SPS 1901, p. 30). The need for cold water is especially pronounced in southern Sweden, where the species lives only at the deep lakes Vänern and Vättern and the seashore of GtL. Almost without exception occurs on completely barren, usually very stony shores, more seldom on gravel or sand. It lives in the immediate vicinity of water, hiding during the day under stones. In the *reg. alp.* it is at home chiefly in the lower parts, but in JtL extends up to an altitude of 1,370 m (Oviksfjällen, May 29, 1937, BGW!), in Tol up to about 1,000 m above sea level (BRD 1934, p. 214). Also found in the tundra of the Kola Peninsula (PPP 1905, pp. 15, 86). In Central Europe chiefly alpine and subalpine (HDH and LTH 1939, p. 134). On the British Isles mainly at running waters (FWL 1887, p. 16).

### Biology

The few dated southern Swedish catches were made chiefly in July and September. Numerous immature specimens observed: in southern Sweden (as far as Gst) from June 9 (Vrm) to June 25 (Vgl); the northern Swedish plain from June 4 (JtL) to July 5 (Ång); and the fjelds from July 6 (Pil) to August 3 (JtL). As assumed by LRS (1939, p. 514), the species certainly breeds in autumn and hibernates in the larval stage, but apparently regularly in the adult stage as well; hence the life span might possibly be two years, at least in the north.

551

### Dynamics

Wings always fully developed in the Nordic material, comparatively even somewhat larger than in *brevicollis*. Thus the beetle has certainly flight capacity, but



to date no flight observations reported. According to JEA (1937, p. 5), *heegeri* Dan. from the Carpathians is an "apterous" form of *gyllenhali*.

### Variation

In the *reg. alp.* generally more or less rufinous individuals are found, sporadically at lower levels also, and southernmost one weakly marked specimen near Vrm Fastiñas (E.T. 1937, p. 116). Also see SPS (1888–1889, p. 96), LBÅ (1927, p. 14), PFF (N.E. 1942, p. 65). This is undoubtedly a modification without zoogeographic significance.

### Fossil Record

Denmark, Sjaëlland, late glacial (HNR 1933, p. 125).

\**Nebria gyllenhali balbii* Bon.  
(*mäklini* Munst.)

### Distribution

*Sweden*: Only a single specimen (*forma rufino*) collected by KRG in Nuolja near Tol Abisko, July 17, 1939 (coll. LTH).

*Norway*: Occurs only in the north, chiefly on the coast, apparently continuously distributed between 31 Bodö (several collectors!) and the Finnish border. Only two true inland records: 36 Målselv, Bjerkeng, 1 specimen (N.E.T. 1936, p. 106); Mollijusfoss, August 14, 1930, 2 specimens (*Oxf. Univ. Exp.*!). North as far as 37 North Cape (according to STA).

*Finland*: Found only in the extreme north, especially on the Arctic Sea coast (several collectors! LBÅ 1933, p. 119!). Additionally near Li Utsjoki (KRG!) and Lp Nautsi (LNN, MÅ!).

*Russian sector*: To date recorded only near Lj Ponoj (PPP 1905, p. 86; MH!).

*Adjacent regions*: British Isles (Joy 1932, p. 327). The Faeroes (West 1930, p. 7). Iceland (LTH 1931, p. 166). Absent in the other adjacent regions.

*Total area*: In the rest of Europe found only in the mountains, south and west extending into the Italian Alps (LUI 1929, p. 46) and France (DEV 1935, p. 19). According to CKI (1927–1933, p. 359) in "Western Siberia, Altai, Tien-Shan". Since BNN (in litt.) has seen no Asiatic specimen, these records are accepted tentatively. Greenland (HNR and LBK 1917, p. 485).

### Ecology

In its mode of life *balbii* completely corresponds with *forma typica*, with which it always lives together. The only difference is in geographic correlation due to

the fact that *balbii* in our region occurs quite predominantly at the sea shore (SPS 1894, p. 55; PPP 1905, p. 86; N.E.T. 1933, p. 267); near Lj Ponoj in the tundra region. In Central Europe, on the other hand, occurs only in the mountains, chiefly alpine (HDH and LTH 1939, p. 135).

### Systematics

The form *balbii*, in contrast to the *rufinos* form ("aberration" *rufescens* Ström"), is a stable, geographically well-defined and certainly genetically established variety (see also LTH 1939b, p. 60). But since it is always found with the *forma typica* and regularly copulates with it (LTH 1931, p. 167), one cannot treat it as a subspecies. Furthermore, *balbii* too has a rufinous form, which has been named *gerhardti* Gabr. (*schneideri* Munst.).

#### \**Nebria livida* L.

##### Distribution

(map in DEV 1930a, p. 105)

*Sweden*: Predominantly a southern species, mainly southwestern. Not found in southern Skå; southernmost localities: Lomma, 1927, 1941, 1942 (Palm!); Silvåkrasjön (ZTT, according to THS 1859, p. 180); Våmbssjön, 1927, 1 specimen (Palm). "Ble" (without more precise locality; ANK, VA!). Öld Hornsjön, numerous (JNS 1922! WRN); Böda (ROS, 2 specimens, ML!). Gtl Fårön (MJB 1905, p. 81; RM! JNS!). Delimiting localities east and north: Lake Små Salen, 1939 (LBL, RM! BRD!); Växjö, 1914 (E.T. 1925, p. 78!); Eksjö, 1927, not rare (Palm); Flisby, 1937, dead specimen (LBL); Ögl Kisa, Övre-Föllingen, 1934, frequent (Palm!); Sdm Halla (E. Julin, coll. FHL!); Husby-Oppunda, 1931, 1934, several specimens (OLS!); Nke Laxå, Västra-Laxsjön, 1901, 1 specimen (RMN, RM!); Vrm, on the lower run and mouth of the Klarälven, 1933 (Palm and LTH 1937, p. 116!); Gräsmark, 1923, 2 specimens (SDN, MG!).

553 *Norway*: Two areas. I. In the southeast four localities: 1 Halden (SIE 1875, p. 81); Öyeren, 1 specimen (SHY 1879, p. 12). 2 Hokksund, June 2, 1878, June 14, 1897, numerous (SHY l.c.). 3 Porsgrund (SIE l.c.). II. Two localities in 6 Jæren: Ogne and Kvalbein (HLS 1915, p. 10).

*Finland*: Predominantly southern, occurs especially in the southeast (Ik), north as far as Kl Salmis, 1941 numerous. (ELF, N.E. 1942, p. 176), and Kexholm (several collectors!). Also on Hogland in the Gulf of Finland (HLL!) and four localities in the mainland southwest: Nl Pernå (KRG); Tuusula (SBJ 1873, p. 63; MH!). Ta Tammela (SBJ l.c.; MH!). St Ikalis (BGR, MH!).

*Russian sector*: Several localities on the eastern bank of Ladoga (several collectors! PPP 1899a, p. 8).

*Adjacent regions:* In Denmark rather widely distributed, both in Jylland as well as on the islands (including Bornholm), but rather rare (West 1940, p. 6). Estonia (SDL 1872); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 327).

*Total area:* Palearctic species. In Europe predominantly eastern, in the mainland west as far as the Rhine (DEV 1935, p. 19; HOR 1941, p. 76); south as far as northern Italy (LUI 1929, p. 45) and Transylvania (PTI 1912, p. 10). Siberia (among others, SBJ 1880, p. 8; PPP 1907d, p. 4; MDL 1931, p. 3), east as far as Vladivostok and Korea (BNN 1925, p. 194). Japan (according to CKI 1927-1933, p. 362).

### Ecology

A stenotopic riparian species, occurring at stagnant and slow-flowing waters, more seldom at the sea. Only on barren banks, consisting of fine, usually more or less loam-mixed sand, rarely of almost pure loam. This carabid requires high soil moisture and hence lives in the immediate vicinity of water. During the day it hides under planks, under debris washed ashore, or under small stones lying around, at loamy places in cracks of the soil; at night it speeds over the surface of the bank with incredible swiftness. The larvae hide in sand throughout the day. Successive species in southern Sweden, *Omophron limbatum*. In the rest of Europe, more than in our region, it is an insect of the coast (S.E.Z. 1852, p. 135; GRD 1937, pp. 38, 66; HOR 1941, p. 76; FWL 1887, p. 15; E.M.M. 1914, p. 63; 1925, p. 143), perhaps also occurring more on loam (HOR l.c.; E.M.M. 1926, p. 258).

### Biology

Swedish catches: V: 5 (first on May 13); VI: 22; VII: 14; VIII: 20; IX: 5. Immature beetles found from May 13 to June 8 (Skå), in Norway, June 2 (SHY 1879); additionally one specimen on July 6 (MJB 1905, p. 81). In Denmark, where rich material exists, the decline in July is much more distinct; here larvae were found from the end of August to November and in April (LRS 1939, p. 317). Thus it is evident that hibernation takes place in the larval stage. However, according to LRS (l.c., p. 359) development probably spans a period of two years and the beetles emerging in summer likewise hibernate, only to breed the following spring. But it is quite strange that all the Swedish specimens examined by me, collected in May and early June (May 13 to June 8), are all soft, newly emerged individuals. It must be conceded that the July minimum in Denmark is difficult to explain (however, see *salina*), but the assumption of a two-year period of development is by no means fully established. In captivity the beetle was fed with flies (MJB 1905, p. 21).



## Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

## Variation

In Scandinavia the *forma typica* and the darker *forma lateralis* Fbr. are found, rarely also intermediate forms. The two forms live together almost throughout our region, but *typica* is rarer than *lateralis*. In Vrm only *forma lateralis* has been found to date, and in Sdm only intermediate forms recorded. Exclusively in Finland (west as far as St Ikalis) and farther east the highly darkened *forma sibirica* Csiki (*thoracica* Krog.) is found. On the other hand, *forma typica* occurs as far as Siberia. It is still not certain whether these forms are only modifications or genetically established.

*\*Nebria nivalis* Payk.

## Distribution

(map in LTH 1935b, p. 581; 1939a, p. 250)

*Sweden*: Widely distributed in the high fjelds of Tol, Lul, and northern Pil (see JNS 1926, pp. 901, 906; BRD 1934, p. 215; LTH 1935a, p. 37). The gap in  
-555 northern Lul relates to an almost unexplored region. Farther south only three records: Lyl Umfors (BOH 1857, p. 23); Tärna, Norra-Storfjället, Moskasjön, 1020 m above sea level, July 6, 1937, 1 specimen (Holm, coll. LTH). Jtl Sylarna, July 11, 1924, 1 specimen (KLF!).

Doubtful: Jtl Bydalen (ALR, 2 specimens, LF!).

Erroneous: Hjd (GLL 1896, p. 4; 1 specimen, coll. GLL, SA = *gyllenhali*!). Lyl Storuman, Dolpatie (ZTT 1833, p. 107; 1840, p. 29; undoubtedly confused with *gyllenhali*!).

*Norway*: Markedly bicentric. In Provinces 22, 23, 24 (the high fjeld region of the south), ten localities, south as far as 22 Finse (HLS) and Prestholt-skaret (coll. HSS), north as far as 24 Langglupdalen in Rondane. Most of the localities found in Jotunheimen; strikingly absent in Dovre. II. In the inland in the north: 32 Saltdal region (SPS 1888–1889, p. 96); Sulitelma region (LTH). 36 Målselv region, several localities (SPS 1910a, p. 64; N.E.T. 1932, p. 24). 38 Storelven in Alta (MST); Bojobaëske (STA). 40 Laksnes and Sirma in Tana (MST). Not found in southern Varanger.

*Finland*: Found only in the fjelds of the extreme north. Several records between Lk Muonio and Le Enontekis (SBJ 1873, p. 63; MH! KRG). Le Saana (LBÅ 1927, p. 14! STN! KRV). Li Utsjoki (SBJ l.c.; KRG!). Lp Pummanki, 1939 (STN!).

*Russian sector*: Found only on the Kola Peninsula: one locality on the



northern coast, two inland, three in the extreme east (PPP 1905, p. 86; MH! MÅ!).

*Adjacent regions:* British Isles, Scotland (LTH 1935b, p. 581; JEA 1937). Not found in the other adjacent regions.

*Total area:* Palearctic species. In Europe, outside the region, found in northern Russia: Kanin (PPP 1909, p. 4); on the Indega Gulf (PPP 1910a, p. 302); Pechora, numerous localities (PPP 1907c, p. 306); Novaya Zemlya (LTH 1935b). In Siberia known only from the arctic region of Ob (SBJ 1880, p. 9; BNN 1925, p. 260). The records farther east are doubtful (PPP 1910a, p. 302); but if JEA's view (1937, p. 4) is correct, that *femorata* Motsch. is identical to *nivalis*, then the species extends as far as Lena and the mountains in southern Siberia. The records from Greenland (see (CKI 1927–1933, p. 364) are based on confusion with *gyllenhali* and *balbii*.

### Ecology

This is the most prominent high alpine species of all the Fennoscandian carabids. Below the timber line, in the *reg. bet.*, it is sighted only on the shores of fjeld brooks or lakes into which such brooks flow, and is certainly an accidental occurrence (PPP 1905, p. 18; LTH 1935b, pp. 582, 615). In the *reg. alp.* this species is native primarily at the edge of perennial snowdrifts (PPP l.c.; BRD 1934, p. 101), where it lives directly on snow and ice and voluntarily moves on the surface (SBJ 1873, p. 63) to hunt numb frozen insects. Also found at brooks of melted snow (SPS 1895, p. 239), more rarely at larger lakes with cold water. Near Tol Kebnekaise ascends to an altitude of 1700 m above sea level (BGW!). Also found in the tundra (PPP 1905, p. 86).

### Biology

All Swedish specimens were found between June 30 and the middle of August. Immature beetles found on July 20 and July 26 (Pil). Hibernation certainly takes place in the adult stage but due to the short duration of summer it is highly probable that half-grown larvae likewise hibernate.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent, however.

### Systematics

Concerning the independent specific status of *nivalis* versus *gyllenhali*, see LTH 1939b.

\**Nebria salina* Fairm.

(*degenerata* Schauf., *iberica* Oliveira, *Klinckowströmi* Mjöb.)

Distribution

(map in DEV 1930a, p. 109)

*Sweden*: Found only in the south. In Skå widely distributed, farther along the west coast and across Ble and southern Små as far as Öld and Gtl. Gaps in distribution may not exist. Northernmost localities: Boh Orust, Slussen (KLF!); Öckerö (several collectors!); Vgl, several localities in the Göteborg region (several collectors!); Hll Släp (SDN, MG! SLL, VA!); Falkenberg, 1935, several specimens (Palm!); Små Markaryd, 1936, 2 specimens (LTH); Tutaryd, 1925, 3 specimens (GTZ!); Växjö (CDG!), 1923 (BRD!); Åsheda, 1930, 1 specimen (GTZ!); Kalmar (WLN, LG!). Öld Böda, Byerum, 1928 (LOH!). Gtl Fårön (MJB, 4 specimens, 557 RM!), 1927, 12 specimens (LOH!). The oldest definite record consists of 2 specimens: Öld Borgholm, April 1871 (TIM, LU!); however, there are at least five other localities known from the nineteenth century (Skå, Ble, Vgl).

*Norway*: In the coastal region of the southwest between 4 Grimstad and the Trondheim region apparently continuously distributed. Northernmost localities: 8 Nordfjord, Sandane, 1937 (KLF!); 27 Stadsbygden (STM, according to MST 1918, p. 705); 26 Froan (LYS, N.E.T. 1923, p. 275; 1937, p. 144). The only true inland record is 21 sirdal (STE, MB!).

Absent in eastern Fennoscandia.

*Adjacent regions*: In Denmark rare, rather widely distributed and certainly insufficiently known; also on Bornholm (West 1940, p. 7). Absent throughout the eastern Baltic region. British Isles (Joy 1932, p. 328); not reported from Ireland, as far as I know, but certainly not absent. Shetland (West 1930, p. 68). The Faeroes (West 1930, p. 8).

*Total area*: Solely European species. Predominantly a western species, east only as far as eastern France (DEV 1935, p. 20; JEA 1941–1942, p. 193), in Germany as far as Rügen and the Mark (HOR 1941, p. 79); also in Bohemia (BNN 1925, p. 274). South as far as southern Spain and Portugal (FUE 1918, p. 43). Doubtful in central Italy (PTA 1934, p. 9).

Ecology

In contrast to the closely related *brevicollis*, this species lives in open terrain, but sometimes meets with the former, at forest fringes for example. It requires moderately moist loamy soil, usually occurring on loam-mixed gravel or sand. Often in the vicinity of the sea, also in gravel pits. On Öld and Gtl in more humid, grass-rich places of the Alvar†. Also on cultivated soil, i.e., loamy fields.

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

Vegetation in all localities frequently sparse and poorly developed. In Central Europe the species seems to be more eurytopic, for instance in the Hamburg region occurs frequently in peat bogs (E.B. 1927, p. 94; also in Denmark: West 1940, p. 7); in Mecklenburg numerous in beech forests (GRD 1937, p. 38). However, in Germany apparently a distinct ecological differentiation between *brevicollis* and *salina* is possible, which is true in our region too, and has been vividly described by NBG (E.B. 1937, p. 379).

### Biology

Distribution of dated Swedish specimens: III: 1; IV: 2; V: 25; VI: 37; VII: 15; 558 VIII: 38; IX: 4; XI: 12. The decline in July is also evident in Denmark (LRS 1939, p. 316) and hence one could be misled into assuming that it is a spring breeder. However, since in Denmark (l.c.) two larvae were discovered in May, and females found in August which had just oviposited, it must be assumed (LRS l.c., p. 358) that, like *brevicollis*, this species breeds in autumn and hibernates chiefly in the larval stage. In Sweden I saw immature beetles only in June, on June 5 (Öld) and June 13 (Gtl).

### Dynamics

Wings as well developed as in *brevicollis* and certainly functional. Flight observations absent however.

### *\*Notiophilus aquaticus* L.

#### Distribution

*Sweden*: Occurs throughout the country, from Skå into the Lapland high fjelds, and distributed without gaps. Only from Mdp are there no records to date. Most abundant in the fjelds. Northernmost localities in the Karesuando parish in the extreme north (LBÅ! BRC, RM!).

*Norway*: Distributed throughout the country continuously and certainly without gaps. Not found to date only in the inland of the extreme south. Northernmost near 37 Honningsvåg (N.E.T. 1922, p. 130).

*Finland*: Almost universally distributed. Strangely, however, there are no records to date from Kl.

*Russian sector*: On the Kola Peninsula occurs all along the coasts, and also in the inland of the west (PPP 1905, p. 86; MH!). In Karelia found to date only in the south, north as far as Kn Tiudie (PPP 1899a, p. 8), but certainly more widely distributed. Also on Solovetsk Island (LEV, MÅ!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 7). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (among others SDL 1872). Leningrad region (OBT 1876). British



Isles (Joy 1932, p. 326), also Ireland (JHS and HLB 1902, p. 559). Shetland (West 1930, p. 74). The Faeroes (West 1930, p. 9). Iceland (LTH 1931, p. 167).

*Total area:* Circumpolar species. In Europe south as far as northern Spain (FUE 1918, p. 45), southern Italy, Sardinia, Sicily (LUI 1929, p. 48), Yugoslavia (montane; APF 1904, p. 62). In the northeast as far as Kanin (PPP 1909, p. 5) and Pechora (PPP 1907c, p. 306). Asia Minor (BOD 1927a, p. 44). Iran (BOD 1927c, p. 38). The Caucasus (CHD 1846, p. 114). Siberia (among others, SBJ 1880, p. 9; RM! MDL 1931, p. 3), east as far as Lena (PPP 1906b, p. 21) and Kamchatka (BNN, NET, SBR 1929, p. 2). North America (Leng 1920, p. 46).

### Ecology

This species has been labeled "aquaticus" quite inappropriately, since it does not occur at shores and is not significantly humidity-loving. It is markedly eurytopic, but throughout seems to prefer gravelly soil, preferably with an admixture of loam, and tolerates only moderate shade. In the southern parts of the region it usually occurs singly (see also MST 1922, p. 139) among moss and roots of grass at forest fringes, edges of fields, etc. In the fields it is much more frequent both in the *reg. bet.* and the *reg. alp.*, and reaches a considerable altitude (Pil: 1225 m; Lul: 1100 m; Tol: 1300 m above sea level). It lives here primarily in the grass-rich meadows and heaths, and also in dwarf shrub heaths with *Empetrum*, *Betula nana*, *Cassiope tetragona*, etc. (constantly together with *Amara alpina*), even on almost bald soil in the immediate vicinity of snowdrifts and glaciers (LBÅ 1927, pp. 9, 14; 1933, p. 114; BRD 1934, pp. 72 ff., 216; LTH 1935a, p. 38). In the Euro-Siberian tundras widely distributed (PPP 1910a, p. 305). In northern Germany, especially in heath forests and high moors (GRD 1937, p. 38). Dahl's contention (1928, p. 39) that this species ecologically agrees with *palustris*, does not correspond to our findings (on the other hand, see *germinyi*).

### Biology

Southern Swedish catches: III: 6; IV: 10; V: 25; VI: 41; VII: 45; VIII: 28; IX: 19; X: 3. The period of emergence is very long; numerous immature beetles have been found from June 20 (Hil) to August 8 (Upl), August 13 (Lul) and September 6 (Ble). In Denmark larvae have been observed from the beginning of June until the beginning of August (LRS 1939, p. 317). LRS (l.c., p. 361) states that this species is an autumn breeder, hibernating almost exclusively in the larval stage. On the contrary, it might be very variable in this respect and hibernates regularly also as an adult, and certainly breeds in the following spring.



Wing dimorphism evident. In brachypterous specimens the wings are reduced to a scale equal to about one-third the length of an elytron. Fully winged specimens are capable of flight; spontaneous flight was observed (ALM!) during sunshine near Hls Bollnäs, August 23, 1942.

### Variation

*N. aquaticus* is highly variable and requires taxonomic revision. It is possible that the large total area recorded for this species is actually not inhabited by one and the same species.

### Fossil Records?

England, late glacial, identified with some reservation (BLR 1924, p. 558). It is also possible that the exclusively fossil species *coriaceus* Henr. (1933, pp. 111, 126) from the late glacial deposits of Skå, belongs here. As pointed out by MST (in litt.), the corrugation of its elytra could quite possibly be a postmortem manifestation.

### *\*Notiophilus biguttatus* Fbr.

### Distribution

*Sweden:* With the exception of Hjd, found in all provinces, and frequent throughout southern and central Sweden as well as lower Norrland. North of latitude about 64° N gradually becomes rarer but also occurs singly in the lower fjeld regions. In northern Lapland there might actually be a gap since the locality in the Torneträsk region is certainly connected with the Norwegian area. Northernmost or highest localities are: Jtl Jorm, two localities, 1932 (JNS and Palm, E.T. 1936, p. 183); Åsl Stalon, 1936, 1 specimen (LTH); Lyl Tärna, 1937, 3 specimens (Holm, coll. LTH); Sorsele, several localities (GTZ, E.T. 1932, p. 46!); Lul Kwickjock, 1924, 2 specimens (LTH); Porjus, 1939, 5 specimens (LTH); Tol Kaisepakte, bank of Torneträsk, July 21, 1939, 1 specimen (LTH).

*Norway:* Except for the actual fjelds, distributed everywhere from the extreme south as far as 38 Lakselv in Porsanger (several collectors). Additionally  
561 two localities in 41 southern Varanger: Neiden (PPP 1905, p. 87); Grense-Jakobselv (N.E.T. 1922, p. 143). Northernmost locality: 37 Honningsvåg (STA).

*Finland:* Universally distributed south of about latitude 65° N; north of the Arctic Circle, rare and highly local. Northernmost localities: Lk Muonio (PPP 1907a, p. 49); Kittilä, Aakenustunturi (SAA 1917, p. 281); Lp Pitkäjärvi, 1929 (STÅ); Yläluostari (LNN, MÅ! STN); Ks Salla (v. Schoultz, coll. STK).

*Russian sector:* In southern Karelia north as far as Kn Perguba (PPP, FA!); certainly more widely distributed. Also Solovetsk Island (PPP 1907a, p. 49).

*Erroneous:* The records from the Kola Peninsula (PPP 1905, p. 87) are definitely wrong. All the specimens examined belong to *reitteri* (MH! MÅ!). The same is true for the record from Kn Dianova-gora (PPP 1899a, p. 8; MH!).

*Adjacent regions:* In Denmark universally distributed and very frequent (West 1940, p. 8). Estonia (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 325), also Ireland (JHS and HLB 1902, p. 559). Shetland (West 1930, p. 74). The Faeroes (West 1930, p. 10). Iceland (LTH 1931, p. 168).

*Total area:* Euro-Caucasian species. In Europe south as far as Portugal (FUE 1918, p. 46), Corsica (DEV 1935, p. 20), southern Italy, Sardinia (LUI 1929, p. 49), Bulgaria (APF 1904, p. 64). In the northeast as far as Mezen region (PPP 1908, p. 4) and northern Ural (PPP 1907d, p. 4). The Caucasus (CHD 1846, p. 114). The record from western Siberia (SBJ 1880, p. 9) is erroneous; all of the six specimens in RM(!) belong to *reitteri*.

### Ecology

In our region a stenotopic forest species, but occurs in very diverse types of forests—deciduous, coniferous, and mixed. The principal requirements are: the forest must be sufficiently sparse to permit direct sunlight on the ground, and the soil only moderately moist or even markedly dry. It lives nevertheless in drier parts of bog forests also (RNK 1938, p. 65). The species has a distinct predilection for gravelly and sandy soil, preferably with an admixture of loam, and the humus cover need not be very prominent. Vegetation moderate to poorly developed and consists, for example, of sparse grasses, *Vaccinium myrtillus*, and often a profuse growth of lichens. The beetle is an extremely fast runner among needles and leaf litter. In the fjelds it is already rare in the  
562 *reg. bet.* (Norway, Jtl, Lul, Tol); from the lower *reg. alp.* only two specimens are known (Jtl Nean, 830 m above sea level, August 4, 1937, WRN! Åre, July 4, 1944, KRG!). In Central Europe also predominantly a forest species, especially in beech forests (GRD 1937, pp. 38, 54; LRS 1939, p. 363). On the other hand on Iceland, which is devoid of forests, the species occurs almost exclusively in open terrain (LTH 1931, p. 168).

### Biology

Southern Swedish catches: I: 1; II: 0; III: 5; IV: 23; V: 93; VI: 120; VII: 71; VIII: 57; IX: 54; X: 20; XI: 3; XII: 2. Numerous immature beetles found between June 24 (Upl), July 13 (Dsl, Vbt) and August 23 (Upl), August 24 (Lul), in 36 Målselv even on September 8, 1929 (N.E.T. 1932, p. 24). In Denmark

larvae have been found from the beginning of June to the end of September (LRS 1939, p. 318). Spring breeder, hibernating as an adult.

### Dynamics

Wing dimorphism evident (already noted by HEB and MEX 1933, p. 59). In brachypterous specimens the somewhat variable wing rudiment attains at most half the length of an elytron. Macropterous individuals are fully winged and certainly capable of flight; there are no direct observations of flight, but in Finland 13 beetles were found in sea drift (Frey 1937, p. 436; PME 1944, p. 37).

#### *\*Notiophilus germinyi* Fauv.

(*hypocrita* Curt. Earlier not separated from *palustris*, in Sweden before 1921, in Norway before 1903, in Finland before 1907)

### Distribution

*Sweden*: Distributed throughout the country and, except for Ång, known from all provinces. In the coastal regions of Bothnia not recorded to date between Mdb Sundsvall (ADZ, LD!) and Nbt Seskarö, 1934 (ERL!) and hence the species occurs there at most very rarely. Otherwise, no apparent gaps in distribution. Also occurs in the fjelds. Northernmost localities situated in Kareuando parish in the extreme north (1935, BRC, RM!).

*Norway*: Except for the northernmost peninsulas distributed throughout the country continuously and certainly without gaps. Northernmost found near 37 Hammerfest (SPS 1899, p. 147, "*palustris*" N.E.T. 1922, p. 141.

563 Erroneous: 11 Trysil, Jordet (E.T. 1937, p. 116, = *palustris*!).

*Finland*: Distributed throughout the country rather unevenly but probably without gaps. But the very sparse occurrence on the west coast is striking. Surprisingly not found to date in the Helsinki region.

*Russian sector*: All records of "*palustris*" from the Kola Peninsula (PPP 1905, p. 86) pertain to this species (PPP 1907a, p. 49; 1910a, p. 305; MH! MÅ!); east as far as Lj Ponoj (MÅ!), also on the northern coast near Lu Jokonga (MH!). In Karelia found to date only in the south, north as far as Kn Juustjärvi (PPP 1899a, p. 8, "*palustris*"; MH!).

*Adjacent regions*: In Denmark widely distributed but to date not found on Bornholm (West 1940, p. 7). Estonia (HAB in litt.). Leningrad region (JAC 1905–1908, p. 265), and also near Lempaala, 1943 (PHJ). British Isles (Joy 1932, p. 326).

*Total area*: Euro-Caucasian species. In Europe south as far as northern Spain (FUE 1918, p. 45), central Italy (LUI 1929, p. 49), Bulgaria (montane; APF 1904, p. 62). East at least as far as Slovakia (ROU 1930, p. 108) and in northeastern Russia (TTR, H.E.R. 1903), and also in the Pechora region



(PPP 1907c, p. 306; 1910a, p. 305). The Caucasus (JAC 1905–1908, p. 265). It is highly possible that the species also occurs in Siberia.

### Ecology

An almost xerophilous species, which in southern Sweden indeed occurs quite often together with *aquaticus*, but also inhabits drier places. In the former case it lives among leaf litter, roots of grass, in moss on boulders, etc. in groves, at forest fringes, in meadows, at most in weakly shaded places. On the other hand it also occurs in sandy or gravelly (also loam-mixed) dry meadows with low vegetation, in lichen-rich pine heaths, on open *Calluna* soil (MST 1922, p. 141; PME, S.H.A. 1939, p. 59), in gravel pits, and even on very dry places in peat bogs. On Öld and Gtl regularly found in grass-rich parts of the Alvar†. In the fields especially in the *reg. bet.*, where it prefers sparse and dry places in *Betula-nana*-rich birch forests (N.E.T. 1932, p. 24; BRD 1934, p. 217). In the *reg. alp.* occurs only very sporadically and found close to the timber line (Hjd Hamrafjäll, July 20, 1938, BRK, Tol Kebnetjäkko, July 14, 1941, BGW! LBÅ 1927, p. 15; PPP 1905, p. 86, "*palustris*"). In Central Europe it is partly montane (also alpine), and in northern Germany, more than in  
564 our region, partly restricted to heath and moorland (WGN, E.M.D. 1915, p. 300; NBG 1929, p. 122; 1933, p. 50; ROU 1934, p. 79; PLZ 1937, p. 7; GRD 1937, p. 38; HOR 1941, pp. 95–87). Strangely, the species has also been recorded in northwestern Germany from moist marshy soil (Dahl 1928, p. 39; "tyrphophilous and hydrophilous," Peus, according to HOR l.c.).

### Biology

Southern Swedish catches: III: 2; IV: 13; V: 27; VI: 64; VII: 51; VIII: 36; IX: 19; X: 4; XI: 1. In Denmark, where the number of adults suddenly increases only in July, larvae were detected from the end of April to the beginning of June (LRS 1939, p. 317). Immature beetles from June 2 (Boh) to July 1 (Upl); in Germany, May 28 (DTZ 1936, p. 50). As assumed by LRS (l.c., p. 362), it is undoubtedly an autumn breeder which, at least in southern Scandinavia, hibernates quite predominantly in the larval stage. In Finland the species has often been seen consuming small spiders (PME, S.H.A. 1939, p. 59).

### Dynamics

Wing dimorphism evident but I have seen to date only one fully winged specimen (Sdm Mariefred, July 22, 1942, LTH). In the brachypterous form the

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



wings are reduced to a very small scale equal to about one-sixth the length of an elytron.

*\*Notiophilus palustris* Dft.

(earlier not separated from *germinyi*; see that species)

Distribution

*Sweden*: From Skå to lower Norrland continuously and apparently uninterruptedly distributed. Northernmost localities: Dlr Lima, 1926, 1931 (OLS!); Mora (KHG!); Hls Los (SJB); Färila, Enskogen, 1941 (LBL, RM!); Mdp Njurunda, July 6, 1936, 1 specimen (LTH); Ång Nordingrå, May 22, 1941, 1 specimen (FIE!); Jtl Revsund, 1943, 3 specimens (BGW!). Also found in Vbt and Nbt, probably separated from the southern area but continuous with the Finnish area: Vbt Bureå, 1936, 1 specimen (LTH); Jörn, 1925, 2 specimens (LTH). Nbt Harads, 1938, 1 specimen (LTH); Lakaträsk, 1940, 1 specimen (LTH). Lul Pålkem, 1941, 2 specimens, 1942, 1 specimen (WRN!).

Doubtful: Jtl Åre (AND, VA!).

565 *Norway*: Found only in southern Norway; somewhat unevenly distributed.

I. In the southeast, west as far as 15 Kongsberg, several localities. On the southern coast near 4 Grimstad. II. In the west, Province 6 (Jæren, Ryfylke), numerous localities; also 7 Bergen, Os, and 8 Askvold. All localities according to MST (N.E.T. 1922, p. 142). III. 11 Trysil, Jordet (E.T. 1937, p. 116, "*germinyi*"!). It is quite probable that the subareas are actually continuous.

*Finland*: South of about 64° N universally distributed and frequent. Northern limit represented by the following localities: Ok Kajana (CRP!); Säräisniemi (WUO, MH!); Ob Uleåborg (WUO 1910, p. 63; MH!). Farther north three isolated localities: Ob Ylitornio (WEG); Ks Paanajärvi (PFF 1943, p. 120); Salla (ENW, MH!). All other records from northern Finland based on confusion with *germinyi*.

*Russian sector*: Occurs only in southern Karelia (several collectors!), north as far as Kn Tiudie (PPP, MH!). For erroneous records from the north, see *germinyi*.

*Adjacent regions*: In Denmark universally distributed and frequent (West 1940, p. 7). Estonia, including Ösel (HAB 1936a and in litt.). Leningrad region, among others, near Lempaala, 1943 (PHJ). British Isles (Joy 1932, p. 326), also Ireland (JHS and HLB 1902, p. 559).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1918, p. 45), central Italy (LUI 1929, p. 48), Bulgaria (APF 1904, p. 62). East as far as Ural (JAC 1905–1908, p. 265). Asia Minor (according to CKI 1927–1933, p. 398). Western and central Siberia (SBJ 1880, p. 9; RM! TTR 1903, p. 113).

### Ecology

Of the four frequent species of *Notiophilus*, this is decidedly the most humidity- and shade-loving species. It lives in somewhat humid deciduous forests, especially among leaf litter and moss, and in the drier parts (at the bases of trees) in *Alnus glutinosa* swamps (also according to RNK 1938, p. 64). Additionally found at forest fringes and on open, more or less moist meadow soil, where the vegetation is fairly tall and thick (e.g., *Filipendula ulmaria*) and the soil mostly covered with a distinct layer of moss. Also occurs in moors, but rarely in *Sphagnum*. Soil composition seems less important, but a marked cover of humus is always present. In Central Europe also found in more or less humid places and, more so than in our region, occurs in bogs (Dahl 1928, p. 39; Peus 1928, p. 576; ROU 1934, p. 76; GRD 1937, p. 38).

566

### Biology

Southern Swedish catches: II: 2; III: 11; IV: 11; V: 55; VI: 69; VII: 25; VIII: 17; IX: 22; X: 7; XI: 3; XII: 1. In Denmark, where the decline in midsummer is still more pronounced, one larva was detected in early September (LRS 1939, p. 317). Immature beetles found in July (Små), August (Vbt), August 16 (Nbt), in Finland (NI Hoplaks) even on September 29, 1935 (RNK 1938, pp. 64, 130). Spring breeder, hibernating as an adult.

### Dynamics

Wing dimorphism evident. In the brachypterous form, wing rudiment smaller than in *germini*. Macropterous form fully winged and certainly capable of flight. Observations on flight absent but this form has been found partly in sea-drift material, 2 specimens near Öld Byerum (June 5, 1943, BRK!), and partly numerous in Finland (Frey 1937, p. 436! STÅ 1938, p. 18; PME 1944, p. 37).

\**Notiophilus pusillus* Waterh.  
(*bigeminus* Thoms., *aestuans* Motsch.)

### Distribution

*Sweden*: Rare and highly local, only in the southwest definitely continuously distributed. Not encountered to date on the eastern coast, from Ble to Stockholm, nor the southern Swedish highland. On the other hand, found on Öld, north as far as Byerum, 1943 (BRK!), and southern Gtl, north as far as Klinte (JNS!). Moreover, the easternmost localities are: Skå Örup, 1925 (ARW!); Ble Sölvesborg, 1929 (Holm!); Små Gårdsby, 1930 (BRD, ML!); Jönköping (leg.?, LS!); Ögl Tåkern, Svälänge, 1933 (LTH); Nässja, shore of Vätter, 1929

(Palm), 1934 (LTH); Motala, Norra-Freberga, shore of Vätter, 1933 (LTH); Upl Värmdön, Väster-Skägga, 1941 (LTH); Uppsala region (WRN!); Häverö, Utsund, 1943 (H. Undén!); Forsmark, 1936 (LTH). Northernmost localities: Boh Fjällbacka, 1924 (LTH); Dsl Bolstad, shore of Väner, 1933, 4 specimens (LTH); Vrm Degerfors, 1936 (LTH); Dlr (probably Hedemora), 1 specimen (RGS!), Stora-Tuna (TJB, coll. LTH); Hls Ljusne, July 2, 1936 (LTH); Iggesund, July 3, 1936 (LTH).

Doubtful: Hls Delsbo region (RUD, MG!).

*Norway*: Only along the southern coast, probably continuously distributed. 1 Hvaler, Kirkeøy; Skjebergkilen (N.E.T. 1922, p. 141). 2 Oslo (HLS 1914, p. 3); Vestre-Aker (HSS). 4 Grimstad (N.E.T., l.c.). 5 Lyngdal, Kvåviksanden; Lister, Kviljo (N.E.T. 1923, p. 239).

*Finland*: Rare, occurring only in two separate areas. I. In the southwest: Al Eckerö (PFF). In the mainland several localities, north as far as Ab Åbo (MER, MÅ!); Ta Tammerfors, 1 specimen (SAR); Hattula (WEG, GBL); east as far as Helsinki (LEV, MH!). II. In the southeast: four localities in the Isthmus of Karelia, west and north as far as Ka Heinjoki (KNG); near Ik Valkjärvi, repeatedly collected (several collectors!).

Erroneous: Om Vetil (NSL, N.E. 1929, p. 110, = *germinyi*!).

*Russian sector*: Sv Vaaseni, 1942 (KRV!). Ko Petrosavodsk (PPP 1907a, p. 48).

*Adjacent regions*: In Denmark rare, occurring chiefly in Jylland, with only two localities on Sjaælland (West 1940, p. 7). Estonia, three localities, including near Veskimäe close to Reval, 1924 (HAB in litt.); not known from Latvia. Leningrad region (BSK 1922, p. 53). British Isles (Joy 1932, p. 326).

*Total area*: Western Palearctic species. In Europe<sup>32</sup> south as far as southern France (DEV 1935, p. 20), southern Italy, Sardinia (LUI 1929, p. 48; HOR 1941, p. 83), Greece (APF 1904, p. 61). East as far as Crimea and Gorki (TTR 1903, p. 111; JAC 1905–1908, p. 264). Near East: Asia Minor, Syria, Iran (SPT 1899, p. 515; CKI 1927–1933, p. 391; HOR l.c.). The Caucasus (TTR l.c.).

## Ecology

An almost xerophilous species. It lives on open, moderate to markedly dry, gravelly and sandy soil (sometimes with an admixture of loam), for instance in *Calluna* fields (N.E.T. 1923, p. 239), sandy fields, sandy shores of lakes (at a considerable distance from water), and also in gravel pits. Vegetation always very sparse. In Central Europe, seemingly more than in our region, occurs on

<sup>32</sup>The distribution in Central Europe is not certain. "The German specimens seem to me in many respects to be aberrant specimens of *aquaticus* (with two preapical elytral pores) or aberrant *palustris* (with dark tibiae)" (HOR 1941, p. 85). A misidentification must have occurred for some of these specimens since *pusillus* is a characteristic, well-delineated species, and at any rate exhibits no similarity with *palustris* (see LTH 1942a, p. 52).



loamy soil, but also on sand, for instance, in pine heaths (C.C. 1928, p. 51; 1929, p. 259; NBG, E.B. 1936, p. 270; GRD 1937, p. 38). The requirement for limestone assumed by NBG (l.c.) is not evident in our region.

## Biology

Distribution of dated Swedish specimens: V: 12; VI: 23; VII: 27; VIII: 13; IX: 12; X: 3. In Denmark numerous larvae observed in July and August, and immature beetles found in August and the beginning of September, from which LRS (1939, pp. 318, 363) has concluded that the species is a spring breeder, hibernating as an adult. Adults have been found in Germany in January, February, and April (Rapp 1933, p. 22), which conforms to this assumption. In our region however, the species behaves differently, since the four immature beetles were all recovered in June, June 12 (Vrm) to June 26 (Boh), and none found before May. For Sweden larval hibernation must at least be considered normal.

## Dynamics

All the specimens examined have fully developed wings that are certainly functional. In Finland several beetles were found in sea drift (Frey 1937, p. 436, "*aquaticus*"!).

*\*Notiophilus reitteri* Spaeth.

(*fasciatus* Reitt. et Popp. nec Mäkl.; see HLL, N.E.  
1921, p. 87)

## Distribution

*Sweden:* In the northern Swedish forest region widely but sparsely distributed and highly local. Vrm Höljes, June 17, 1933, 2 specimens (Palm and LTH 1937, p. 116!). Dlr Älvdalen, Mossiberg, June 16, 1939, 1 specimen (KLF!); Hamra, 1927 (JNS and SJB 1932, p. 16!). Hls Los, repeatedly collected (SJB, E.T. 1928, p. 116!); Färila, July 19, 1927 (JNS!). Mdp Boda, Paljacka summit, August 1935, 2 specimens (BRC, RM!). Jtl Ragunda (FRI, 1 specimen, VA!); Revsund, 2 specimens (BGW!); Hottön, August 31, 1936, 6 specimens, August 1939, 1 specimen (BRD!). Ång Tjärn (northeast of Ruske), June 1939, 1 specimen (BRC, RM!). Vbt Degerfors, Kulbäcksliden, July 1935, several specimens (FRL!). Lyl Stensele, Fjällsjönäs, July 16, 1930; Sorsele, Giltjaur, June 18, 1930, Duoblan, July 5, July 18, 1929, Skansnäs, August 17, 1927 (Ågren, coll. GTZ; E.T. 1932, p. 46!). Lul Pålkem, three localities, August 13–14, 1940, 8 specimens (LTH); Kwickjock, Snjäarak, July 12, 1924, 1 specimen (LTH).

*Norway:* Solitary records almost throughout the country; only in the extreme north also on the coast. 15 Lyngdal, Teksle, July 1923, 1 specimen; 24



Sörem in Vågå, June 1925, 1 specimen (N.E.T. 1926, pp. 158). 28 Steinkjer, August 1925, 2 specimens (N.E.T. 1926, pp. 149, 158; 1937, p. 144); 30 Grong, 569 June 1928 (N.E.T. 1926, pp. 149, 158); 32 Ramnå 1915 (NTV, MO!). 38 Alta, Bossekop (N.E.T. 1922, p. 142); Jotkajokk (MST); Lakselv in Porsanger, numerous (several collectors); 40 Matjok in Tana (N.E.T. 1922, p. 142); 41, five localities in southern Varanger, partly numerous (several collectors; N.E.T. 1922, l.c.).

*Finland:* Very widely distributed but with pronounced (real?) gaps. In the inland north of about latitude 65° N probably continuous, south as far as Ob Rovaniemi, Viiri, and Kumpu-Kivalo (KNG!); Ks Kuusamo (MKL, MH!); Ok Ruhtinassalmi (SSK, MÅ!), Suomussalmi (CRP!). The connection with (and among) the localities lying farther south remains uncertain. Om Brahestad (WUO, coll. HLL!). Kb Nurmes (SBJ, MH!); Juuka, Juuanvaara, 1940 (KRG!). Ta Korpilahti (RNK 1938, p. 64); Juupajoki (PHJ, S.H.A. 1935, p. 150); Pirkkala (GBL!); Tb Saaryjärvi, Pyhähäkki, 1943 (KRG). Ik Kivennapa, several specimens (RNK l.c.; S.H.A. 1936, p. 46!).

*Russian sector:* Numerous localities in the southern part of the Kola Peninsula (SEM 1904, p. 300; PPP 1905, p. 87, "*biguttatus*"; 1907a, p. 51; MST, N.E.T. 1922, p. 119; MH! MÅ!). Isolated near Kn Dianova-gora (PPP 1899a, p. 8, "*biguttatus*"; MH!).

*Adjacent regions:* No records.

*Total area:* Palearctic species. In Europe, outside the region, as far as I know found only in the Mezen region (PPP 1908, p. 4). Siberia (among others, SBJ 1880, p. 9, "*biguttatus*"; RM! SPT 1899, p. 522), east as far as Lena (PPP 1907a, p. 51), south as far as Minusinsk (MST 1923, p. 240). Northern Mongolia (JAC 1905–1908, p. 265).

## Ecology

Predominantly a forest species. In the southern half of the Fennoscandian area, it appears to be a marked spruce forest animal (N.E.T. 1926, p. 142; E.T. 1928, p. 116) and always lives at dark, more or less distinct humid places with *Hylocomium* and similar plants, under bark, and in moss and litter of dead needles; in Finland especially in bog forests (KRG 1939, p. 1220), "in southern Finland exclusively in dark grove-like spruce bogs" (RNK 1938, p. 64). In the high north the species is less stenotopic and also occurs in drier, more open places, especially in birch forests (MST 1922, p. 142). According to RNK (l.c., pp. 64, 108) the stenotopy in southern Finland is microclimatically conditioned. In the fjelds the species regularly reaches the *reg. bet.*, but only one specimen has been found to date (accidentally?) in the *reg. alp.* (Lp; LBÅ 1933, p. 114).

## Biology

Dated Scandinavian specimens known to me distributed as follows: IV: 2; V: 0; VI: 12; VII: 12; VIII: 23; IX: 0; X: 1. Immature beetles, found on August 13, August 14, 1940 (Lul Pållem). May hibernate as an adult.

## Dynamics

Wing dimorphism evident but to date I have only seen one fully winged beetle (Lul Pållem). In the brachypterous form the narrow wing rudiment is equal to about half the length of an elytron.

*Notiophilus rufipes* Mrsh.

## Distribution

*Sweden*: Only 1 specimen: Skå Markie-hage, August 1867 (MLF, MG!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark rare, two localities in southern Jylland, and also on Fyn and in the Copenhagen region (West 1940, p. 7; HSN and LRS 1941, p. 37). Absent throughout the eastern Baltic region. British Isles (Joy 1932, p. 325).

*Total area*: Western Palearctic species. In Europe predominantly a western species (absent in northeastern Germany; HOR 1941, p. 88), east as far as Poland (TEN 1937, p. 336), Slovakia (ROU 1930, p. 109) and Transylvania (PTI 1912, p. 11); absent in the European part of Russia. South as far as Portugal (FUE 1918, p. 46), Corsica (DEV 1935, p. 20), southern Italy, Sardinia, Sicily (LUI 1929, p. 49), Greece (OTZ 1886, p. 205). Asia Minor (JAC 1905-1908, p. 265). The Caucasus (SDR and LDR 1878, p. 58).

## Ecology

According to records from the rest of Europe, this is a forest species that is ecologically closest to *biguttatus* and has even been found together with it (E.M.M. 1917, p. 109). However, *rufipes* seems to occur exclusively in deciduous forests, in moss and leaf litter under birch trees (West 1940, p. 7), oak (E.M.M. 1916, p. 89), and beech (E.B. 1935, p. 107; HOR 1941, p. 89). Generally, occurs in sparse forest stands and usually only on moderately moist soil; it is especially fond of bog soil.

## Biology

In Denmark found in all months from March to November with most specimens found in May (LRS 1939, p. 318). I saw an immature beetle dated Oc-

tober 6, 1931 (Copenhagen). Spring breeder, hibernating as an adult (l.c., p. 362).

### Dynamics

To date I have only seen fully winged specimens of this species (from Denmark, western Germany, Austria, France; 8 specimens). The insect is probably capable of flight, but flight observations are absent.

#### *\*Odacantha melanura* L.

##### Distribution

(map in LTH 1943b, p. 120)

*Sweden*: Partly in the southeast (Skå, Ble, Öld, Gtl), and partly in central Sweden, with a wide gap between the two regions. I. Delimiting localities in Skå: Råå, 1915 (RNG, 1 specimen, ML!), 1937, 2 specimens (BRD!), Örbyängar, 1942, 1 specimen (PLQ); Ringsjön, Sjöholmen, May 1, 1939, 1 specimen (BRK, ML!), May 22, 1941, 5 specimens (HZE!), found by none of the older entomologists in the Ringsjö region; Österslöv, Ekestad, June 1904 (ROS, ML!). Ble Sölvesborg, 1936 (JNS); Karlskrona, September 1, 1943, 3 specimens (SDH!). Öld (Meves RM! ANK, VA! BOH, HM! THS, 1859, p. 220), Hornsjön, 2 specimens (BOH, manuscript in K.V. Ak.); Föra, Marsjö, May 1928 (LOH, according to JNS). Gtl Stånga, Asasjön, September 15, 1927, 1 specimen (LOH, coll. JNS!); Gothem, at the river, May 24, 1940, 2 specimens (LTH). II. Central Sweden: Delimiting localities—Ög Gryt, Danebosjön, 1932, 1 specimen (LOH, according to JNS); Adelsnäs, 1916 (TGR, VA!); Tåkern, repeatedly found (Palm! JNS); Vgl Hornborgasjön, collected three times since 1938 (WGS, ML! BRK!); Nke, numerous localities in the Örebro region (several collectors!); Vst Strömsholm, 1936, numerous (LTH); Västerås region, numerous (several collectors!); Upl Fiby, 1937 (BRD!); Vendelsjön, 1941, several specimens (FIE!); Erken, 1941, frequent (LTH); Norrtälje and Rådmansö, 1936 (LTH).

Erroneous: Dlr (ANK, 2 specimens, VA! Certainly wrong labeling).

*Norway*: Only one locality on the Swedish border: 1 Hvaler, Arekilen in Kirkeøy, since 1915 (NTV, MST; N.E.T. 1920, p. 60; MO!).

*Finland*: In the Isthmus of Karelia two localities: Ik Terijoki, numerous (KRG!); K1 Kexholm (KRV, N.E. 1923, p. 129! KRG). Recently rediscovered near Helsinki—Tölövikén, September 14, 1939, 1 specimen (PME, S.H.A. 1940, p. 81)—where the species was found once, more than a century ago (SBC 1834, p. 268). Al Finström, 1943, numerous (LBÅ).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed but not frequent (West 1940, p. 51); the occurrence on Bornholm (Catalogus, 1939, p. 10) has not



been confirmed (West in litt.). Doubtful in Estonia (SDL 1891); Latvia (SDL 1872; ULN 1884), Leningrad region (OBT 1876). British Isles, only England and Wales (Joy 1932, p. 369).

*Total area:* Palearctic species. In Europe south as far as central Spain (FUE 1921, p. 224), central Italy, Sicily (LUI 1929, p. 144). Montenegro (APF 1904, p. 346), Transylvania (PTI 1912, p. 41). The Caucasus (JAC 1905–1908, p. 407). Iran and Trans-Caspian region (JAC l.c.; BOD 1927c, p. 43). Siberia (JAC l.c.), east as far as Amur (HEY 1880–1881, p. 17).

### Ecology

On the shores of eutrophic, *Phragmites*-rich lakes or ponds, rarely at brackish water. Predominantly on soft loamy or gyttja† ground. This species lives in the outermost part of the *Phragmites* zone, especially where extensive beds of reed from the previous year are lying in water. When treading these downward the beetle appears. In winter and at high tide the carabid hides in leaf sheaths or in hollow stems, but otherwise likes to climb the plants with great speed. In the second place (after *Phragmites*), *Typha latifolia*, less often *Glyceria spectabilis*, are preferred by this species; in the rest of Europe species of *Typha* are mentioned often as the actual “host plant” (SDT 1870, p. 406; SHM 1860, p. 255; GRD 1937, p. 71; HOR 1941, p. 350; JEA 1941–1942, p. 1011; FWL 1887, p. 136); in our region *Odacantha* often lives in places where *Typha* is absent. Constant successive species: *Agonum thoreyi* and *Paederus riparius* L.

### Biology

Swedish catches: II: 1; III: 1; IV: 13; V: 32; VI: 28; VII: 12; VIII: 7; IX: 8; X: 2; XI: 0; XII: 1. In Denmark maximum abundance already in April and two larvae were collected in July (LRS 1939, p. 349). Immature beetles were collected between July 26 and August 18 (Upl). Copulation observed on June 3, June 8 (Sdm). Spring breeder, hibernating exclusively as an adult. Observed  
573 spontaneously consuming a Collembola (LTH 1943b, p. 124); in captivity feeds on pieces of *Lumbricus* (Upl Djursholm, LTH).

### Dynamics

Wings fully developed and comparatively broad; contrarily the apical part is extremely small. I have attempted many times without success to induce the insect to flight upon exposure to sunlight, artificial light, and to warmth. Nevertheless, the insect has probably flight capacity.

†(cf. page 69; suppl. scient. edit.).



\**Olisthopus rotundatus* Payk.

Distribution

*Sweden*: In southern and central Sweden widely and apparently continuously, albeit somewhat unevenly, distributed; very local. Actual gaps not apparent but on the southern coast of Skå surprisingly not recorded. Rather frequent only on Öld and Gtl as well as in parts of the western coast (for instance, the Göteborg region). Northernmost localities: Boh Fjällbacka, 1936 (CDB, coll. LTH); Dsl Köpmannebro, 1933 (LTH); Vrm Uddeholm (SJB); Lundsberg, 1941, 1 specimen (WRN); Vst Nora, 1936, 1 specimen (LTH); "Vst" (certainly Västerås region; JHN in litt.); Upl Uppsala region, found at least since 1906 (several collectors!); Östhammar, 1936, 1 specimen (LTH); Singö (RGS!).

*Norway*: Found exclusively on the coast. Continuously distributed at least in the southwest, between 4 Grimstad (MO!) and three localities on the Sogne Fjord: 8 Lavik (STE, MB!); Vadheim, August 11, 1937 (KLF); 19 Hönserodden (N.E.T. 1930, p. 329). Farther north two localities: 9 Ålesund (SIE 1866, p. 377); 28 Vällersund (N.E.T. 1923, pp. 256, 276; 1937, p. 147). Finally, two localities in the southeast: 1 Halden; 2 Oslo.

Erroneous: 1 Sarpsborg; 2 Ringerike; 24 Dovre, Fokstua (SIE 1875, p. 102; not included by MST for unknown reasons).

*Finland*: Found only in the south, usually very rare, its distribution highly discontinuous. I. Åland, three localities: Eckerö, August 1938, numerous (PFF, N.E. 1939, p. 40; WLL); Sund (FRS, MH!); Lemland (HLL). II. Southwest, four localities on the mainland: Ab Sammatti (KRG); Lojo (PME); Ni Helsinki (Jäppinen, coll. HLL!); Ta Hattula (WEG). III. Southeast, six localities, northwest as far as Ka Viborg (MNH, MH! and Sa Taipalsaari (EHN, MH!).

574 *Russian sector*: Found only in Sv: Mjatusova, 1875 (PPP 1899a, p. 17); Kuujärvi and Uslanka, 1943 (PFF).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 43). Estonia, one locality on the northern coast (HAB in litt.); Ösel (SUM 1931; HAB 1936a); Dorpat (SDL 1872). Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876; BSK 1929). British Isles (Joy 1932, p. 368), also frequent on Ireland (JHS and HLB 1902, p. 580). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 17).

*Total area*: Western Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 196; doubtful according to JEA 1941–1942, p. 870), central Italy (LUI 1929, p. 132), Albania (APF 1904, p. 287). Asia Minor (ECH 1922, p. 35). The Caucasus (CHD 1846, p. 135).

Ecology

A xerophilous species. Lives on dry, sun-exposed gravelly or sandy soil (at

most, with a slight admixture of loam), with only sparse discontinuous vegetation consisting of *Calluna*, dry grasses, *Cladonia*, and similar plants; it even occurs on lichen-covered rocks and boulders. PFF (N.E. 1939, p. 40) has provided a description and photograph of a typical habitat on Åland. On Öld and Gtl the species is quite especially characteristic of those parts of the Alvar† which are grass-rich and overgrown with solitary *Juniperus* bushes. Less often in sparse pine heath; also in gravel pits. In Central Europe occurs chiefly as in our region (see C.C. 1928, p. 52), but additionally also in moors (SRN 1926, p. 28; Peus 1928, p. 577), but probably only in their drier parts. Dahl (1928, p. 97) on the other hand, strangely states that the species generally lives in humid places.

### Biology

Swedish catches: III: 5; IV: 7; V: 14; VI: 32; VII: 47; VIII: 27; IX: 5; X: 2; XI: 2. Numerous immature beetles found between June 9 (Gtl) and July 15 (Små). In Denmark one larva collected at the end of May, and LRS (1939, pp. 329, 391) is certainly correct in assuming autumn breeding and larval hibernation. However, the number of adults which hibernate is very large as well.

### Dynamics

- 575 Wing dimorphism evident. In the brachypterous form the wing rudiment forms a blunt triangle, not even equal to one-fourth the length of an elytron. Macropterous specimens have fully developed wings and are probably capable of flight. According to CRN (1884, p. 12) "not rare in gas tanks" in Elberfeld (see p. 15 above).

### \**Omophron limbatum* Fbr.

#### Distribution

(map in BCH 1938, no. 8)

*Sweden:* Found only in the south, chiefly inland. The area seems to be entirely continuous. It is striking that the species occurs in Små only in the west. Delimiting localities: Hll Halmstad (LTK, according to THS 1867a, p. 66); Vgl Håcksvik, Spaden, 1936, frequent (LTH); Limmared, on a smaller river, 1936, 4 specimens (LTH); Borås, Dalstorp, Hullareds-sjö, July 18, 1867 (leg.?, MG! Borås region, Blomgren, 2 specimens, MG!). Ögl "Omberg," 1884 (MRT, 1 specimen, MG! Not found by Palm in this region; see E.T. 1931, p. 36); Kisa, on three different lakes, July 1934, numerous (Palm!); Små Norra-Unnaryd, on

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

Nissan (Ahlberg); Skillingaryd, 1936, 1942 (LTH, JNS); Värnamo, 1936, numerous (LTH); Ryssby, Tutaryd, 1 specimen (GTZ). Skå Bromölla (Neander, E.T. 1913, p. 76. "Northeastern Skå," WLG, 1886, p. 6).

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rather rare but widely distributed, also on Bornholm (West 1940, p. 11). Latvia (SDL 1872; ULN 1884); not known from Estonia. In Leningrad region near Jamburg (BSK 1908a, p. xxxix).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1918, p. 47), Corsica (DEV 1906, p. 9), southern Italy, Sicily (LUI 1929, p. 49), Greece, and Crete (OTZ 1886, p. 205). Northern Africa (BED 1895-1914, p. 37). Asia Minor (BOD 1927a, p. 46). The Caucasus (CHD 1846, p. 113; SDR and LDR 1878, p. 58). Turkmenia (HEY 1896, p. 8). Kirgizia (HEY 1880-1881, p. 3). Siberia (HEY l.c.; JAC 1905-1908, p. 266), and in the Orient (MDL 1931, p. 4, subspecies *aequale* Mor.). In Baluchistan, the Himalaya, and Japan different subspecies are found (CKI 1927-1933, p. 408).

### Ecology

Found on sandy shores with a more or less strong admixture of loam of stagnant or slow-flowing waters (only one immature species at the sea; Skå Ven, 576 HZE). At the water there must always be a broad margin of absolutely barren sand in which the insects lie shallowly buried during the day near the onset of the vegetation cover. If water is poured here, the insects promptly appear. There are usually species of *Bledius*, e.g., *talpa* Gyll., in these localities. In Central Europe, as in our region, usually found on fresh water (see RTT 1908, p. 76; NBG 1929, p. 121), but in Denmark also occurs regularly at the sea (EGT, E.M. 1901, p. 127; West 1940, p. 11).

### Biology

Swedish catches: V: 12; VI: 12; VII: 11; VIII: 4. An immature beetle was found on August 27, 1938 (Skå, HZE). In Denmark fully-grown larvae have been found from the end of May to the end of August, and immature beetles also found in the same long period. LRS (1939, pp. 319, 366) assumes that development spans a period of two years, and that larvae as well as adults hibernate. In the light of the Swedish material available this question cannot be resolved. In captivity the beetle was fed with flies (BLK 1925, p. 16).

### Dynamics

Wings fully developed. Spontaneous flight observed in Germany in twilight (KTT 1873-1874, p. 136; Dahl 1928, p. 41).



\**Oodes gracilis* Villa.

Distribution

(map in LTH 1943b, pp. 119, 120)

*Sweden:* Found exclusively in lake Mälär region, especially in the close vicinity of Stockholm (all localities in LTH l.c.). Delimiting localities: Sdm Söderfjärden, 1937, numerous (Palm, E.T. 1938, p. 91!); Mariefred, two localities, 1942, numerous (LTH); Huddinge, Långsjön, 1922 (LBÅ, E.T. 1924, p. 191); Botkyrka, Alby, 1942, 1 specimen (LTH); Upl Kungsängen, 1941, 2 specimens (FIE!); Djursholm, Ösbysjön and Ekebysjön, 1941–1944, frequent (LTH l.c.); Lidingön, Kottlasjön, August 9, 1941, several specimens (FIE!).

Absent in the rest of Fennoscandia and the adjacent regions. Nearest localities lie in the northeastern Germany (HOR 1941, p. 198).

577 *Total area:* Western Palearctic species. In Europe markedly southern, in the west north as far as northern France (DEV 1935, p. 36), east of the Alps as far as eastern Prussia (HOR l.c.). East as far as southeastern Poland (LTH l.c.) and southern Russia (JAC 1905–1908, p. 310; PJT, E.A. 1929, p. 455). Asia Minor; the Caucasus (also LSH 1936, p. 142); Turkmenia (see LTH l.c.).

Ecology

The mode of life of this species in Sweden has already been described in detail (LTH 1943b). It lives exclusively on stagnant, eutrophic waters that warm up strongly in summer, predominantly on banks of quaking land (gyttja†) with a rich vegetation of *Phragmites*, *Carex*, *Typha latifolia*, etc. However, it lives here only in summer (observed between May 9 and September 18), and its winter quarters in our region is not known. In the rest of Europe, *gracilis* seems to have the same mode of life, and records from xerothermic places in Austria and Slovakia certainly refer to places of hibernation, which have still not been discovered in our region (LTH l.c.). The beetle has a stable temperature preferendum that is constantly higher than in *helopioides* (LTH l.c., pp. 136, 143).

Biology

The species hibernates exclusively as an adult. Larvae have been found from June 23 to August 18, immature beetles between July 30 and September 18. Both beetles and larvae are polyphagous carnivores and in captivity fed on all types of insects, spiders, and worms; also cannibalistic (LTH l.c., pp. 114–115).

†(cf. page 69; suppl. scient. edit.).



## Dynamics

Wings fully developed and the beetle is a good flier. However, flight has been observed only at the beginning and end of summer; in July and August the carabids could not be induced to fly no matter what method was employed (l.c., p. 115). Capability of dispersal is considered very good.

\**Oodes helopioides* Fbr.

## Distribution

(map in BCH 1938, no. 33; LTH 1943b, p. 120)

578 *Sweden*: Partly in the southeast, including Öld and Gtl and partly in a broad belt across central Sweden. The intervening gap in northern Små is not large, so that a continuity between the two subareas is possible. I. Delimiting localities of the southern region: Skå Herrevadskloster, 1891 (VNS, 2 specimens, ML!); Ble Rödeby, Flaken, 1937, 1 specimen (SDH!); Små Skatelöv, Åsnen, 1941, 1 specimen (CHR); Mönsterås, Emme, 1932, 1 specimen (LOH!). Öld Stora-Rör region (several collectors!); Föra, Marsjö (LOH, according to JNS). Gtl Gothem, eastern end of Lina-myr, May 24, 1940, 1 specimen (LTH). II. Delimiting localities of the central Swedish area: Hll Släp (SDN; 3 specimens, MG! ÅGR!); Vgl Göteborg region, rare (several collectors!); Dsl Bolstad, 1933 (LTH); Vrm Köla, Ränken, 1942, 1 specimen (LNM!); Fryksta, 1933 (LTH); Alster, 1938 (GTZ!); Lundsberg, 1936, 1941, found singly (WRN!); Vst Grythyttan, 1936, numerous (LTH); Dlr Hedemora, 1935 (JNS!); Gst Ovansjö, Väsaren, June 30, 1936, 5 specimens (LTH); Upl Mehede (ARW!). Southward: Sdm Trosa (SJB); Ögl Norrköping, Svärtinge, 1926, 2 specimens (WSJ!); Kisa, Hargsjön, 1941, 2 specimens (LOH!); Små Tranås, 1940, 1941, numerous (LGN!); Jönköping (POR, LJ!). In the north one completely isolated locality occurs: Mdp Timrå, Bergforsen, June 26, 1943, 1 specimen (C.M. Landin, coll. LDN).

Doubtful: Boh (WIB, 5 specimens, MG!).

*Norway*: Only one locality: 3 Fiskum, Hegstadmyra (MST, N.E.T. 1920, p. 60).

*Finland*: In the south widely distributed, perhaps without gaps, but surprisingly absent in the Åbo region. Especially inland, extends much farther north than in Scandinavia. Northern limit represented by the following localities: Ab Nystad (SDM, MH!); St Karkku (HLL, MH!); Tb Virrat (KNG); Jyväskylä (SBJ, MH!); Sb Iisalmi (SBJ, MH!); Nilsia (LEV, MH!); Kb Juuka, Halivaara (KRG!), Jukka (LBG!). Additionally, somewhat isolated, 1 specimen near Oa Malaks, Åminneborg (SAR!).

*Russian sector*: Found only in southern Karelia (PPP 1899a, p. 17), north as far as Kt Povenssa (ENW, MH!).

*Adjacent regions:* In Denmark rather rare but widely distributed, in southern Jylland as well as on the islands, including Bornholm (West 1940, p. 22 and in litt.). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884; LBÅ 1932). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 358).

*Total area:* Palearctic species. In Europe south as far as Spain (FUE 1919, p. 103), central Italy (LUI 1929, p. 86), Greece (APF 1904, p. 159). Northern Africa (BED 1895–1914, p. 101; JEA 1941–1942, p. 981). Kirgizia (JAC 1905–1908, p. 310). Western Siberia (HEY 1880–1881, p. 23). Usti-Abakansk (JEN, MO!).

579

### Ecology

Occurs on loamy banks, but preferably gyttja† (even if stony or somewhat sandy) at stagnant fresh waters. The water is frequently dirty and smells strongly of  $H_2S$ , the soil soft and wet, and the vegetation rich, consisting of *Phragmites*, *Equisetum*, *Scirpus silvaticus*, *Comarum*, *Calla*, *Cicuta*, and similar plants, but with bald patches of gyttja here and there. The carabid lives partly subaquatic and when threatened voluntarily goes underwater along plants. In Central Europe the species also lives, as in our region, in bogs (BLK 1925, p. 22; GRD 1937, p. 50). In Germany the species purportedly remains on shores in winter (WHF 1881, p. 18), which does not seem to be the case in our region. The temperature preferendum of the carabid is labile, but always lower than for *gracilis* (LTH 1943b, p. 136).

### Biology

Swedish catches: III: 4; IV: 9; V: 49; VI: 48; VII: 14; VIII: 4; IX: 6. In Denmark, where the decline in July is likewise abrupt, larvae have been found from the end of July to the beginning of August (LRS 1939, p. 345); in our region small larvae have been found on July 18 and July 27 (Upl; LTH 1943b, p. 131); immature beetles found on August 15 (Sdm) and September 29 (Upl). Spring breeder, hibernating exclusively as an adult. The beetle is a polyphagous carnivore and also cannibalistic (LTH l.c., p. 115).

### Dynamics

Wings fully developed but considerably smaller than in *gracilis* (LTH 1943b, p. 112, Fig.). However, *helopioides* also possesses flight capacity; spontaneous flight was observed in the spring of 1941 (Vrm Lundsberg, WRN). In Finland two specimens were found in sea drift (PME 1944, p. 38).

†(cf. page 69; suppl. scient. edit.).

## Fossil Records

Skå, postglacial (HNR 1933, p. 141). Ång, interglacial (?) (MJB 1916, p. 7). Finland (Ik), postglacial (PPP 1911, p. 36). Denmark, interglacial (HNR l.c.).

*\*Panagaeus bipustulatus* Fbr.  
(*quadripustulatus* Sturm.)

## Distribution

*Sweden:* Only in the southeast, almost exclusively on the coast. Very rare in  
580 the mainland. Skå Våmbsjön (THS 1859, p. 271); Sandhammaren, Kabusa, June 11, 1935, 3 specimens (Palm); Simrishamn, May 7, 1939, 1 specimen (HZE). Ble (certainly Karlskrona region; ANK, according to THS 1867a, p. 53; 3 specimens, VA!). Öld, between Vickleby (LTH, SJB) and Köping, Klinta, 1928 (LOH, according to JNS), several localities (numerous collectors!). Gtl distributed throughout the island, but found only singly; also in Fårön, two localities, 1927 (LOH!). Små Kalmar (several collectors!); Fliseryd, July 6, 1937, 1 specimen (WLE, coll. LTH); Oskarshamn, 1879 (STH, coll. THS, ML!). Ögl Gryt, Breviksnäs, September 4, 1932, 1 specimen (LOH, coll. JNS!); St. Anna, Korsnäs, June 6, 1938, 1 specimen (WSJ, coll. LTH). Finally there is a completely isolated inland locality: Nke Äsplunda (RGS, E.T. 1913, p. 232; coll. LTH).

*Norway:* Absent.

*Finland:* Al Kökar, Idö, on the seashore, July 6, 1939, 2 specimens (STK). Possibly only casual occurrence.

*Russian sector:* Sv Kuujärvi, 1943, 1 specimen (PFF).

*Adjacent regions:* In Denmark rare and found only on the islands, including Bornholm (West 1940, p. 21). Estonia, two localities: Dorpat; Kuusnõmme on Ösel (HAB in litt.). Latvia (SDL 1872; ULN 1884; LCK in litt.). Not known from Leningrad region to the best of my knowledge. British Isles (Joy 1932, p. 344).

*Total area:* Western Palearctic species. In Europe south as far as southern France (DEV 1935, p. 35), central Italy (LUI 1929, p. 84), Bosnia (APF 1904, p. 153), Transylvania (PTI 1912, p. 23), southern Russia (JAC 1905–1908, p. 307). Iran (BOD 1927c, p. 48). The Caucasus (CHD 1846, p. 115).

## Ecology

A xerophilous species, namely compared to *crux-major*; the two species never occur at the same place in our region. On dry, sandy or gravelly soil (with some admixture of humus) in open situations and with rich, usually rather tall vegetation, in Skå consisting of *Sarothamnus*. On Öld and Gtl usually in



the dry meadow-type marginal region of the Alvar† (*Anthriscus silvestis*, *Inula salicina*, and similar plants) on the stone walls characteristic of these islands; also on grassy Alvar with moss and *Juniperus*; sometimes in gravel pits. Always solitary specimens. According to older records this species lives in Central Europe very much like *crux-major*, even together with it (CLS 1851, p. 111; DLT 1879, p. 20; LTZ 1885–1892, p. 20); West (1940, p. 21) strangely mentions for Denmark “moist or semimoist” soil (contrarily, see LRS 1939, p. 424; HSN 581 and LRS 1941, p. 107). Otherwise, all more recent authors emphasize the aforementioned difference between the two species (FRH 1897, p. 13; KRS 1905, p. 135; Dahl 1928, p. 183; GRD 1937, p. 50; Wolf 1939, p. 9; HOR 1941, p. 191; JEA 1941–1942, p. 986; FWL 1887, p. 28; E.M.M. 1925, p. 94).

### Biology

Swedish catches: V: 6; VI: 12; VII: 4; VIII: 3; IX: 3; X: 2. In Denmark, where the May–June maximum abundance is still more pronounced, this species has been considered a spring breeder hibernating as an adult (LRS 1939, pp. 346, 424). The same is certainly true in our region also.

### Dynamics

Wings fully developed and certainly functional. There are no flight observations and my several attempts (Gtl, May 1940) to induce a beetle to flight upon exposure to sun were not successful. However, the occurrence of two specimens on Idö Island in Finland (see above) is interesting.

### \**Panagaeus crux-major* L.

#### Distribution

*Sweden*: Over southern and central Sweden widely and continuously distributed. But in the actual southern Swedish highland the species seems to be absent and has not been found to date in large parts of the eastern coast. Extremely local and sporadic. Delimiting localities west and north: Boh Bro, Säm, in the stomach of a crow (NOT 1943, p. 67); Vgl Göteborg, Hisingen, not found again in the last three to four decades (SDN, manuscript; 1 specimen, MG!); Vänersborg, 1906 (FBG!); Halleberg, 1938 (SVS); Kinnekulle (MRT 1873, p. 10; 1 specimen, MG!); Mariestad, in the stomach of a crow (NOT 1943, p. 38); Otterbäcken, 1936, 3 specimens (LTH); Vrm Visnum, 1943 (WRN); Alster (ZRN); Nke Örebro (JNS! RGS!); Vst Västerås region (SLL, VA!); Upl Fibysjön, 1942, 2 specimens (LBL, RM!); Älvkarleö, 1937 (Palm!); Dlr

†(Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).



Husby (AND, LF); Sundborn, Logården (KLF); Gst Öster-Färnebo, Dalälven, 1935, 5 specimens (Palm). Two completely isolated localities in Nbt: Luleå, Karlsvik, on the river, June 18, 1938, 1 specimen (LTH); Karungi, river bank, July 12, 1941, 1 specimen (BRK, ML!).

Erroneous: Hjd (GLL 1896, p. 5; no voucher specimen).

- 582 *Norway*: Only one locality: 10 Kongsvinger, Vingersjöen, September 14, 1925, May 1934, 1 specimen each (N.E.T. 1926, p. 159; 1937, p. 24).

*Finland*: In southern and central Finland distributed widely but sparsely, and with little continuity. It is still not certain whether an actual gap exists on the southern coast between Helsinki region (several collectors!) and Ka Koivisto (KNG); however, the species is found on Hogland in the Gulf of Finland (SRS, MH!). Northernmost, widely separated localities: St Karkku (STK); Tb Saarijärvi, July 6, 1919 (Listo, FA); Om Haapavesi (HEL, NL); Sa Kristina (SUH!); Punkaharju (KNG); Kb Kitee (PME).

Doubtful: "Lapponia" (old specimens in MH! and coll. SAA!).

*Russian sector*: Found only in the Swir region (PPP 1899a, p. 17; PME! PFF!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 20). Estonia, also in Wormsö (LBÅ 1924b; HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 344), also Ireland (JHS and HLB 1902, p. 564).

*Total area*: Palearctic species. In Europe south as far as Portugal and the Balearic Islands (FUE 1919, p. 97), southern Italy, Sardinia, Sicily (LUI 1929, p. 83), Greece (OTZ 1886, p. 206). Northern Africa (BED 1895–1914, p. 93). Asia Minor (JEA 1941–1942, p. 986). Iran (BOD 1927c, p. 27). The Caucasus (SDR and LDR 1878, p. 66; LSH 1936, p. 142). Siberia (among others, SBJ 1880, p. 41; RM!), east as far as Amur (HEY 1880–1881, p. 22) and Lena (PPP 1906b, p. 65).

### Ecology

- Found on the shores of stagnant or slow-flowing waters, only singly and more accidental at the sea. Beetles are mainly found in the immediate vicinity of water chiefly in spring (during the breeding period), especially on wet, often loamy, grass- or moss-rich shores, together with *Blethisa*, *Chlaenius nigricornis*, and others; less often on more or less barren sandy or loamy shores under debris washed ashore, and the like. Later in summer the beetles move considerably away from water and are found more in humid meadows. The species thus seems to reflect the marked "change of habitat" of *Oodes gracilis* and most species of *Chlaenius*. Moreover it is very peculiar in occurrence, and its ecological requirements are difficult to define. In Central Europe its winter
- 583 quarter under the bark of trees has been noted many times (GLK 1896, p. 30; HOR 1941, p. 91; JEA 1941–1942, p. 986). The record from Denmark (LRS

1939, p. 424) is strange, according to which the species has a predilection for ruderal places.

### Biology

Swedish catches: III: 1; IV: 9; V: 21; VI: 15; VII: 10; VIII: 9; IX: 8; X: 4. In Denmark numerous larvae found in July and August (LRS 1939, p. 346). Spring breeder, hibernating exclusively as an adult.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent, however, and my several attempts to induce flight upon exposure to sun and warmth were not successful. However, in Finland 11 specimens have been found in sea drift (Frey 1937, p. 436; PME 1944, p. 38).

### Fossil Record

Galicia, glacial (SCL 1916, p. 47).

*\*Patrobus assimilis* Chaud.  
(*clavipes* Thoms.)

Distribution  
(map in HDH and LTH 1939, pl. VIII)

*Sweden*: Predominantly a northern species, but found in all provinces except Öld and Boh. In the north universal, including the actual fjelds, and frequent. In the central Swedish loamy region the species is very rare, but farther south, especially in the southern Swedish highland, there are numerous localities; nevertheless the number of individuals here is usually small. Delimiting localities in the south: Gtl Sanda, 1926 (JNS, E.T. 1927, p. 208!); Källunge, 1934 (LOH!); Boge, Tjelders, 1942 (BGW!); Hall, 1934, 2 specimens (LOH!); Fårön, Vinor (JNS l.c.). Små Misterhult, Stora-Bankhult, 1932 (LOH, according to JNS). Ble Rödeby, Flaken, 1937 (SDH!); Spjutsbygd, 1943, 8 specimens (SDH!); Ronneby region (ERC, MG!), Hjortsjön (LUG, coll. LTH); Hovmansbygd, 1912 (POR, LJ!). Skå Arkelstorp, 1935 (LOH!); Östra-Broby, Tydingen, 1935 (LOH!); Osby, 1938 (CHR!); Vittsjö, 1890 (VNS, 2 specimens, 584 ML!); Stehag, 1881, 2 specimens, 1882, 1 specimen (MLC, HM! MU! MLG 1863, p. 16). Hll Halmstad, 1 specimen (WSL!), 1922, 2 specimens (Lindström, ML!); Rolfstorp, Valasjön 1940 (LOH!). Vgl Mölndal (ERC, 4 specimens, MG!).

*Norway*: Continuously distributed throughout the country and without gaps. On the southern coast, however, only a few localities. Most frequent

in the fjeld regions and north of the Arctic Circle. Northernmost locality: 37 Honningsvåg (JEN, according to STA).

*Finland:* Almost universally distributed but somewhat rarer in the south. The gap on the west coast between about latitude 61° N and 63° N might be due to insufficient investigation. From Åland there is only one old specimen (SRS, MH!) without more precise locality data; on the other hand the species is found on Al Kökar Island, July 2, 1925 (STN!) and Ab Nagu Island (REU, MH!). Not found on the islands in the Gulf of Finland.

*Russian sector:* Certainly universally distributed (PPP 1899a, p. 12; 1905, p. 91), but due to insufficient investigation in Karelia, to date found northward only as far as Kr Suma (LEV, MÅ!).

*Adjacent regions:* In Denmark very rare; only five localities in Jylland, on Sjaëlland and Læsø (West 1940, p. 20). Not known from the Baltic States.<sup>33</sup> Leningrad region (OBT 1876). British Isles (Joy 1932, p. 354), also Ireland (JHS and HLB 1902, p. 590). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 14).

*Total area:* Probably solely an European species. Boreoalpine (HDH and LTH 1939, p. 137), but less typical (HOR 1941, p. 190), since the zone of extinction in eastern Germany is almost being bridged. In Central Europe, in the northern German plain and the mountains, extending east into the Sudetes (according to ROU 1930, p. 141, also in the northern Carpathians). In the northeast as far as Kanin (PPP 1909, p. 6) and Pechora (SBJ 1898, p. 338). In Siberia probably absent; from the single primary report (SBJ 1880, p. 21) I saw a voucher specimen (RM, = *septentrionis*!).

### Ecology

Predominantly an inhabitant of the high boreal coniferous forest region. In the northern part of the region the species is extremely eurytopic. It lives there both in open situations and in moderately dense forests, occurring partly on fair to very dry soil, especially moraine, e.g., in places typical for *Miscodera*, and partly on very moist soil in and along bogs and moss-rich swamps, as well as on shores of oligotrophic or dystrophic lakes (especially those of small  
585 forest lakes), often in *Sphagnum* and on peat soil. Concentration to humid biotopes is very pronounced in southern Sweden, where it lives especially in forest bogs with *Alnus glutinosa*, particularly in places described for *Trechus rivularis*. This deviation in occurrence might be due to cold rather than a requirement for humidity (see RNK 1938, p. 66). In Germany and the British Isles also *assimilis* is a distinct inhabitant of bogs (PTY 1914, pp. 50, 67; HDH and LTH 1939, p. 139; HOR 1941, p. 190; FWL 1887, p. 130). Throughout

<sup>33</sup>Upon my request, HAB sent me a series of specimens of *atronufus* from various places in Estonia. Their identification was correct and there was no specimen of *assimilis* among them.



the fields the species crosses the timber line, but does not extend high into the *reg. alp.* (in Hjd and Jtl up to 860 m, WRN!; in Tol up to 800 m above sea level, BRD 1934, p. 255); also found in the tundra of the Kola and Kanin Peninsulas (PPP 1910a, p. 314).

### Biology

Southern Swedish catches: III: 3; IV: 6; V: 14; VI: 23; VII: 49; VIII: 8; IX: 3. Immature beetles found in southern Sweden between June 25 (Upl) and July 10 (Dsl), in northern Sweden from June 23 (Vbt), July 5 (Nbt) until August 22 (Lul). In the south, as assumed by LRS (1939, p. 387), hibernation certainly takes place quite predominantly in the larval stage. In the north presumably both, adults and larvae, hibernate, and development there might span two years.

### Dynamics

Wings constantly stunted and barely attain one-third the length of an elytron. However, because of the eurytopic character of the species, at least in the north the capability of dispersal is not poor.

*\*Patrobis atrorufus* Ström.  
(*excavatus* Payk.)

### Distribution

*Sweden:* Occurs throughout southern and central Sweden, in lower Norrland in the coastal region, and in a broad belt across Ång and Jtl in continuation with the Norwegian area. Delimiting localities: Dlr Lima, not rare (OLS!); Orsa, 1908 (UYT 1909, p. 297, and in litt.); Hls Ljusdal (SJB); Färila, Stocksbo, 1942 (LBL, RM!); Jtl Svenstavik and Berg, 1943 (LDN); Vallbo, 1935 (RNG, 2 specimens, ML!); Ånn; Handöl; Storlien; 1934 (LTH). Jtl Jorm, several  
586 localities (JNS and Palm, E.T. 1936, p. 184!); Ulriksfors, 1936 (LTH); Åsl Åsele, July 24, 1936, 1 specimen (LTH); Ång Sollefteå (ARN, according to JNS); Örnköldsvik, July 9, 1936, 7 specimens (LTH). Quite isolated locality: Nbt Harads, Bodträskfors, on loamy humus soil influenced by culture, June 24, 1938, 5 specimens (LTH).

Erroneous: Lapland (GLL 1896, p. 15; "*Harpalus rufipes*" of ZTT 1840 undoubtedly refers to *assimilis*; see LTH 1938, p. 20).

*Norway:* Distributed continuously from the extreme south as far as Lofoten and, except for the fields, without gaps. North of the Arctic Circle, these localities: 31 Bodö (several collectors!); 32 Saltdal (N.E.T. 1923, p. 290); Furulund, July 1925 (LTH); 33 Djupvik in Folden; 34 Röst (according to STA); Östvägöy (STE, MO!).

*Finland:* In the south everywhere, becoming rarer north of latitude 62° N; not known from the eastern parts north of Kb Hammaslahti (KTK, N.E. 1931, p. 39). The absence of this species on the western coast north of Ab Nystad (SDM, MH!) is certainly only apparent. Northernmost localities: Tb Viitasaari (LBG); Om Vetil (NSL!); Nivala (PME!); Brahestad, Leppälä (FA!).

*Russian sector:* To date only three localities in southern Karelia: Sv, mouth of Swir, 1942 (KRH!); Uslanka, 1943 (PFF!); Ko Petrosavodsk (PPP 1899a, p. 12).

*Adjacent regions:* In Denmark frequent everywhere (West 1940, p. 20). Estonia, including Ösel (SUM 1931; HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 590). The Faeroes (West 1930, p. 15). Iceland (LTH 1931, p. 173).

*Total area:* Palearctic species. In Europe south as far as central France (DEV 1935, p. 34), northern Italy (LUI 1929, p. 82), Bulgaria (APF 1904, p. 147). The Caucasus (KHN 1941, p. 178). Western Siberia (SBJ 1880, p. 21. I was not successful in seeing a voucher specimen, but the report by KHN l.c., p. 177 is accepted)

### Ecology

Occurs on loamy soil more or less mixed with humus and moderately to very moist. The species requires some shade and hence lives in deciduous forest, parks and gardens, and on meadow and cultivated soils with rich vegetation, often of a distinct weedy type (*Arctium*, tall *Rumex*, and so forth). It is generally a species favored by culture, perhaps because it likes rich soil†. Also occurs  
587 on shaded loamy banks, and under seaweed on the sea. In Jtl (and Iceland; LTH 1931, pp. 173, 387) it also lives on grassy soil with a very low humidity. The fjeld regions are reached in Sweden only in Jtl where, near Storlien, the species ascends high into the *reg. bet.*; the species never reaches the *reg. alp.* In Central Europe too the species is markedly eurytropic (see GRD 1937, p. 42).

### Biology

Southern Swedish catches: I: 1; II: 0; III: 2; IV: 7; V: 39; VI: 78; VII: 73; VIII: 56; IX: 21; X: 3. Numerous immature beetles found between June 18 (Ble) and July 13 (Vgl), August 3 (Dir), in Norway even on June 10 (Bergen). Very numerous larvae observed in Denmark (LRS 1939, p. 327) from the end of March to the beginning of June, and two larvae at the end of October; in Finland they were often found in winter on snow near Tb Jyväskylä

†("fette Erde" in German, probably means "fertile", "rich"; suppl. scient. edit.).

(S.H.A. 1942, p. 207). Hence larvae hibernate and, to a lesser extent, also the adults (LRS l.c., p. 386).

### Dynamics

Wings constantly stunted to a slender rudiment equal to about one-fourth the length of an elytron. As an eurytopic species, *atorufus* nevertheless has a good capability of dispersal, especially in cultivated regions. On occasion it might perhaps be displaced by man.

### Fossil Records

Scotland, interglacial (Bell 1922, p. 46). Bavaria, glacial (FLH 1884, p. 4). France, "lignites quaternaries" (FLC 1875, p. 1234). Possibly confused with *assimilis*.

\**Patrobis septentrionis* Dej.

(*picicornis* Zett., *hyperboreus* Dej., *rubripennis* Thoms.)

### Distribution

*Sweden*: Distributed throughout the fjelds, south as far as Dlr. Secondly, also in the Norrland forest region and far into the plain along the rivers, but extends as far as the coast only on the Torne-älv†. Lower delimiting localities: Dlr Älvdalen (HGL, 2 specimens, MG!); Särna, Fulufjäll, Njupekär, August 5, 1927 (FRL!). Hjd Vemdalen, 1913 (LBL, RM!). Jtl Revsund, 2 specimens (BGW!); Ulriksfors, 1936, frequent (LTH). Ång Hoting, 1936, 4 specimens (LTH). Å sl Å sele, 1936, numerous on the river (LTH). Lyl Lycksele (ZTT 1840, p. 40), 1936, frequent (LTH). Vbt Hällnäs, Bodarna, 1935, 1 specimen (HEQ!); Kusfors, 1930, 1 specimen (LTH and Palm 1934, p. 36!). Nbt Boden, 1941, 1 specimen (KMK!); Harads, 1938, 2 specimens (LTH); Haparanda, 1934, 1 specimen (ERL, coll. LTH); Karungi, 1 specimen and Vitsaniemi, 5 specimens, 1930 (LTH and Palm, l.c.).

Doubtful: Vbt Umeå (ZTT 1840, p. 40; ZTT confused the species with *atorufus*; see LTH 1938, p. 19). Dlr Orsa (UYT 1909, p. 297, and in litt.).

Erroneous: Vgl Kinnekulle (UYT 1913a, p. 19, and in litt.).

*Norway*: I. In the fjeld regions of the south widely distributed and frequent; south as far as 21 Gaukhei; 16 Vestfjorddal; 12 Eidsvoll. Northernmost in the Röros region (25); also near 28 Kongsstua, July 16, 1840 (ZTT, ML!). II. In the north, from 30 Majavatn (LYS, according to STA) as far as 37 North Cape (SIE 1875, p. 90) and 41 southern Varanger; found everywhere, even on the coast.

† ("älv" means river in Swedish; suppl. scient. edit.).



*Finland:* Frequent throughout the fjeld regions of the extreme north, but southward rapidly decreases in number. Delimiting localities: Lk Kittilä (several collectors!); Lp Saariselkä (PFF, N.E. 1942, p. 66!); Ka Salla, Vuorikylä (STK); Paanajärvi (KRG! RNK 1938, p. 66); Kuusamo (SBJ, MH! MÅ!). Farther south, apparently three isolated localities: Ok Kajana (HLL, MH!). Oa Seinäjoki, 1936, 2 specimens, under planks in the timber yard of a sawmill (PHJ!). Kb Juuka, Juuanvaara, Koljunkorpi, northern slope of a cold-water brook, about 300 m above sea level, July 5, 1941, 1 specimen (KRG!).

*Russian sector:* Occurs throughout the Kola Peninsula (PPP 1905, p. 91!). In Karelia only near Kc Wojatsch (SBJ 1873, p. 91; MH!).

*Adjacent regions:* Not found in Denmark (regarding *australis*, see below) nor the entire eastern Baltic region. British Isles (Joy 1932, p. 353), also Ireland (OMH 1929, p. 24). The Faeroes (West 1930, p. 13). Iceland (LTH 1931, p. 171).

*Total area:* Circumpolar species. Typical subspecies (see subspecies *australis* below) boreo-alpine in Europe, and in Central Europe occurs only in the Austrian Alps (HOR 1941, p. 189), Switzerland (KHN 1941, p. 174), Savoy (DEV 1935, p. 34), and northern Italy (LUI 1929, p. 82). Also, northeastern part of Kanin (PPP 1909, p. 6) and near Pechora (SBJ 1898, p. 338; PPP 1907c, p. 308). Siberia (among others, SBJ 1880, p. 21; RM!), east as far as Amur (BOD 1927b, p. 46), Lena (PPP 1906b, p. 34) and Kamchatka (JAC 1905–1908, p. 305), Bering Island (SBJ 1887, p. 63). North America, widely  
589 distributed (DRL 1938, p. 166; rejected by JEA 1941–1942, p. 571, erroneously and with no justification). Greenland (HNR and LBK 1917, p. 486).

### Ecology

Occurs mainly in the *reg. alp.* of the fjelds, as well as in the tundra where it is markedly eurytopic. Lives both in meadows and heaths, preferably in the vicinity of snowdrifts, climbing them to hunt for numb frozen insects; also in bog swamps ("Moorsümpfe"); avoids only the driest and most barren places (BRD 1934, p. 224; LTH 1935a, p. 39). Successive species in particular: at wetter places *Nebria gyllenhali*, at drier *Amara alpina*. The species *septentrionis* extends almost as high up as *A. alpina*: Tol 1100 m (BRD 1934, p. 225), Lul 1150 m (Vaisaluokta, RDB!), Pil 1235 m (LTH 1935a, pp. 14, 39), Lyl 1300 m (Tärna, Gurtispakte, Holm!), and Jtl 1200 m above sea level (Oviksfjällen, BGW!). In coniferous forest regions only in humid places, partly on larger rivers (less often, other bodies of water) on loamy-muddy banks overgrown with species of *Carex*, together with *Pelophila* and *Agonum dolens*, partly also in *Sphagnum* of forest swamps, for example under litter of *Salix*.

### Biology

The beetle is found throughout the short Nordic summer, at the earliest on May 8 (Vbt Hällnäs) and the latest on September 1 (Jtl Undersåker). Numer-

ous immature beetles found between June 21 (Vbt) and August 14 (Pil), most of them in July. Undoubtedly both larvae and adults hibernate, and development probably spans two years. In Tol a beetle was observed on a snowdrift feeding on an ichneumonid (BRD 1934, p. 225).

### Dynamics

Wings fully developed. Spontaneous flight observed in arctic Norway (*Oxf. Univ. Exp.!*).

### Variation

Similar to *Nebria gyllenhali*, in the *reg. alp.* this species is generally more or less rufinous, while in the forest regions only dark specimens are found (see LBÅ 1927, p. 17; LTH 1931, p. 384; PFF, N.E. 1942, p. 66). This is undoubtedly just a modification.

590

### Fossil Records

Jtl, late postglacial (SGR 1924, p. 45). Skå and Denmark, late glacial (HNR 1933, p. 129).

*\*Patrobis septentrionis australis* J. Sahlb.

### Distribution

*Finland:* Occurs only inland in the south in two regions that are only partially interconnected by the locality Nl Elimä (SBJ 1873, p. 91). I. Näsijärvi region (Ta, St, Tb), with these delimiting localities: Ta Vanaja (WEG); Hauha (SDM, MH!); St Karkku (HLL!); Tb Virrat (KNG). II. In the Ladoga region (Ik, Kl) numerous localities between Ik Rautu (KRG!) and Kl Kirjavahti (PPP, FA!), also on Valamo Island (KNG). Undoubtedly these two localities belong here: Kb Kontiolahti (LNN, MÅ!) and Juuka, 1940, 1 specimen (KRG!).

*Russian sector:* Only three localities: Sv Haapanava (PPP 1899a, p. 12; MH!); Gumbaritsa, 1943, 1 specimen (PFF!); Kn Solomino (SBJ 1873, p. 91; MH!).

Scandinavia: Absent.

*Adjacent regions:* In Denmark found only on the islands (not Bornholm) and rare (West 1940, p. 20). Not known from the Baltic States; on the other hand certainly found in Leningrad region (OBT 1876, "*septentrionis*").

*Total area:* In the broader sense this subspecies also includes the Central European forms *relictus* Ner. and Wagn. and *bitschnau* Reitt. The former is known only from northern Germany: Mk Brandenburg and Mecklenburg (HOR 1941, p. 189!). The *forma bitschnau* is known from the lower Alps in

Bavaria and Austrian Tyrol (HOR l.c.; KHN 1941, p. 174), and in the French Alps (DEV 1935, p. 34). The true *forma australis*, outside the region, is known only from western Siberia (SBJ 1880, p. 21; LTH 1943a, p. 17).

### Ecology

In Finland, according to the meager ecological data available to date, *australis* lives on lakesides and mainly under dry leaf litter and such, on sandy soil (SBJ 1871a, p. 332; 1873, p. 91; KRG in litt.). In Denmark and northern Germany respectively, this form and *relictus* have been found on the shores of ponds, preponderantly in the forest (West 1940, p. 20; HOR 1941, p. 189).

### Biology

Periods of development not known. The conclusions drawn by LRS (1939, pp. 327, 387) are not tenable because he has lumped the Scandinavian and Danish material (viz., *septentrionis* s. str. and *australis*) together.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### Systematics

For the taxonomic relationships of *australis*, see KHN 1941 and LTH 1943a.

### \**Pelophila borealis* Payk.

#### Distribution

(map in LTH 1935b, p. 583)

*Sweden*: In the Norrland forest region (as far as Dlr) widely distributed and locally frequent, but reaches the Bothnian coast only southward as far as Vbt Bureå (1936, 1 specimen, LTH). Also found in the fjelds, but less frequent. Lower delimiting localities: Dlr Mora (RGS, E.T. 1913, p. 231! SDN, 2 specimens, MG!); Orsa, 1908 (UYT 1909, p. 297, and in litt.); "Dlr 61°30," probably on the Dal-älv† (AND, according to GLL 1896, p. 3); Särna, Fulufjäll, Stora-Rörsjön, 1927, 2 specimens (FRL!); Hjd Vemdalen, Norra-Vemån, 1913 (CDG!); Jtl Berg, 1943 (LDN); Bispgården, 1930, numerous (LTH and Palm 1934, p. 33!); Ång Mellån, 1939, 11 specimens (BRC, RM!); Långsele, 1930, 1 specimen (LTH and Palm l.c.!); Vbt Hjuken, on the Ume-älv (BOH 1857, p. 17).

Doubtful: Hls Delsbo region (RUD, 2 specimens, MG!).

†(cf. page 587; suppl. scient. edit.).



*Norway*: I. In the fjeld regions of the south widely distributed, south as far as 22 Haukeli and 16 Rauland (ULL); 16 Tinnoset (MST); 2 Modum (SIE 1875, p. 80); 10 Kongsvinger (MST). Also on 1 Hvaler (CTT 1868, p. 46), but certainly occurs accidentally. II. In Trondheim region only near 28 Steinkjer (N.E.T. 1937, p. 144). Farther north gradually becomes more frequent and 592 continuously distributed as far as 37 Honningsvåg (STA) and 41 southern Varanger. Starting from 31 Bodö also on the coast.

*Finland*: North of about latitude 65° N, almost universally distributed; farther south, except for the solitary record near Om Jakobstad (SBJ 1873, p. 62; MH!), occurs uninterrupted only inland at least as far as Sb Kuopio (LEV, ENW; MH!). In the south only the following widely separated localities: Ta Lempäälä (PTK, MÅ!); Sa Kristina (LNN, MÅ!); Kl Soanlahti (EHN, MÅ!); Kb Suojärvi (Gråsten, MH!); Ik Metsäpirtti, Taipale (FRS: N.E. 1921, p. 113).

*Russian sector*: On the Kola Peninsula found almost everywhere (PPP 1905, p. 85). In Karelia only two localities to date: Kk Kunttijärvi (PPP l.c.; MH!); Lake Kc Wig (SBJ 1873, p. 62; MH!).

*Adjacent regions*: Not found in Denmark (HSH and LRS 1941, p. 33). In Estonia, near Techelfer (RHL 1921, p. 54). Leningrad region (OBT 1876; BSK 1929). British Isles, only Ireland and Orkney (Joy 1932, p. 326; JHS and HLB 1902, p. 561). Shetland (West 1930, p. 74).

*Total area*: Circumpolar species. In Europe Boreo-British (LTH 1935b, p. 583). From Central Europe only two solitary records in northern Germany (HOR 1941, p. 83), probably due to accidental displacement (but see LTH l.c., p. 625). In the northeast as far as Pechora (SBJ 1898, p. 338; PPP 1907c, p. 306). Siberia (among others, PPP 1907d, p. 4), east as far as Lena (PPP 1906b, p. 21) and Kamchatka (BNN 1930, p. 97). North America, widely distributed (BNN l.c.).

## Ecology

On fresh-water shores of various types, large as well as small, stagnant as well as slow-flowing, and less often on the sea. Always in wet places in the immediate vicinity of water, and only where the ground material (sand, gravel, stones) shows a considerable admixture of loamy mud and the vegetation is usually rather rich, including particularly species of *Carex*. However, the species prefers places where the vegetation cover is not completely closed and where mosses do not play an important role (not in *Sphagnum*). Especially frequent on the middle and lower reaches of the large northern Scandinavian rivers. Successive species: *Agonum dolens* and often *Patrobus septentrionis*, sometimes *Nebria gyllenhali* (on stony banks). Predominantly a carabid of the high boreal forest region, which already in the *reg. bet.* occurs sparsely, albeit 593 regularly; within the *reg. alp.* in Scandinavia, occurs only singly in the lower

parts (LBÅ 1927, pp. 9, 14; BRD 1934, p. 216, in Tol up to 1000 m above sea level; LTH 1935a, pp. 25, 37); more frequent in the tundra of the Kola and Kanin Peninsulas and in western Siberia (PPP 1905, p. 85; 1909, p. 5; 1910a, p. 303). On the British Isles on loamy shores of fresh water (JHS and HLB 1902, p. 561).

### Biology

The beetle is found throughout the brief Nordic summer, at the earliest on May 27 (Nbt) and the latest on September 4 (Jtl). Numerous immature beetles found between July 24 (Åsl) and August 20 (Lul). The beetles undoubtedly hibernate, but it is still not certain whether in our region the larvae hibernate as well. In Ireland development spans a period of one year and only the beetles hibernate (JHS and CPT, *Trans. Ent. Soc. London*, 1898, p. 133). According to these same authors, the larva consumes meat in captivity.

### Dynamics

Wings fully developed. Spontaneous flight (many beetles) has been observed in Russian Lapland (ENW, E.T. 1884, p. 163) and on Ireland (JHS and HLB 1902, p. 561). In Kebnekaise region (Tol), on July 12, 1941, 2 specimens, which had certainly drifted, were found on the surface of glaciers at an altitude of 1300 to 1700 m above sea level (BGW!).

### Variation

The species is unusually variable and can be divided into several subspecies and varieties that earlier were generally treated as separate species, which were very rightly merged by BNN (1930). In Fennoscandia the population is comparatively homogeneous, and the specimens from Kola Peninsula earlier separated as "*ochotica* F. Sahlb." (PPP 1905, p. 85) do not deserve a separate identity. Rufinous individuals occur in the fjeld regions.

*\*Perileptus areolatus* Creutz.  
(*Blemus areolatus*)

Distribution  
(map in LTH 1939a, p. 255)

*Sweden*: Only four localities. Hll Falkenberg region, probably Vessige, 1 specimen (FGQ!). Vrm Fastnäs, Sandnäs, June 9, 1 specimen Vingäng, June 13, 3 specimens on the bank of Klarälven, 1933 (Palm and LTH 1937, p. 118!). Hls Ramsjö, Lerbäcken, June 26, 1943, 5 specimens (LDN!). Might also occur in Dlr.

*Norway:* In the extreme south near 6 Audnedal. Other localities located in the southeast: 16 Seljord; 2 Ringerike; Oslo region, several localities (SIE 1875, p. 89; HLS 1891a, p. 11); 12 Lötén, 1832 (N.E.T. 1930, p. 319); Ilseng.

*Finland:* Only recently discovered in the extreme southeast: Kl Salmis, Uuksunjoki, June 1938, 3 specimens (PFF, N.E. 1938, p. 131; PME, S.H.A. 1939, p. 219!).

*Russian sector:* No records.

*Adjacent regions:* Absent in Denmark and not known from either the Baltic States or Leningrad region. British Isles, partly Scotland (Joy 1932, p. 342), partly Ireland (OMH 1929, p. 24).

*Total area:* Palearctic species. In Europe south as far as southern Spain (FUE 1919, p. 85), Corsica (DEV 1935, p. 29), southern Italy, Sardinia, Sicily (LUI 1929, p. 72), Greece, and Crete (OTZ 1886, p. 206). In Russia north only as far as Kiev (JAC 1905–1908, p. 296). Northern Africa (BED 1895–1914, p. 82). Asia Minor (APF 1904, p. 125). Iran (BOD 1927c, p. 16). The Caucasus (CHD 1846, p. 192; SDR and LDR 1878, p. 84). Kirgizia and western Siberia (HEY 1880–1881, p. 47; JAC l.c.).

### Ecology

Both within the region and in Central Europe (according to numerous reports) the species occurs only on more or less fast, large or small, bodies of running water. It lives on barren banks consisting of gravel or coarser sand and are often very stony, in the immediate vicinity of water. Successive species in our region in particular: *Bembidion virens*, *prasinum*, and *saxatile*, on the Klarälven River also *Thinobius longipennis* Heer. The recovery of three specimens from a heap of rotting wastewood near a river bank in Kl Salmis (N.E. 1938, p. 130) was possibly a casual occurrence.

### Biology

Periods of development not known. Catches from Sweden and Finland made only in June. Since the species was caught in Moravia in both March and October (S.E.Z. 1852, p. 168), hibernation probably takes place in the adult stage.

### Dynamics

Wings fully developed. Spontaneous flight has been observed many times in Central Europe (BACH 1851, p. 81; EVS 1898, p. 64; JEA 1926, p. 411).



*Pogonus luridipennis* Germ.

## Distribution

*Sweden*: Only one locality: Boh Solberga, seashore close to Röstången, July 23, 1943, 9 specimens, July 1944, several specimens (LDN and HNS!).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark, only near Esbjerg, 2 specimens (West 1940, p. 20). Absent throughout the Baltic Sea region. British Isles, only England (Joy 1932, p. 353).

*Total area*: Palearctic species. In Europe occurs in the south and west (for instance, in northern Germany only on the North Sea; HOR 1941, p. 186), along the western coast south as far as Spain (FUE 1919, p. 95). On the Mediterranean coast in southern France (DEV 1935, p. 34) and northeastern Italy (LUI 1929, p. 81); in Bulgaria (APF 1904, p. 148) and southern Russia (JAC 1905–1908, p. 303) on the Black Sea. Northern shore of the Caspian Sea (JAC l.c.). Inland at saline places in France (DEV l.c.), Germany and Austria (HOR l.c.), Poland (Kinel, P.P.E. 1930, p. 272), Transylvania (PTI 1912, p. 22), Rumania (ROU, C.C. 1927, p. 114), Russia north as far as Ryazansk (SEM 1898, p. 77). Northern Africa (BED 1895–1914, p. 88). The Caucasus (SDR and LDR 1878, p. 67), Kirgizia and western Siberia (HEY 1880–1881, p. 24).

## Ecology

Halobiont (LNG 1929, p. 56). In Boh the species was found under withered algal flakes on the loamy shore of a marshy meadow together with *Bembidion minimum*. In the rest of Europe occurs partly on the sea, in places regularly flooded, and partly in inland saline places (LNG l.c.). "Prefers muddy places," among others, those overgrown with *Salicornia* (Rapp, 1933, p. 60).

## Biology

The beetle has been found in Central Europe both in spring (LNG l.c.) and late autumn (October; Rapp l.c.). Larvae found in summer (up to August)  
 596 (BUR 1939, p. 97). One may thus assume that hibernation takes place in the adult stage.

## Dynamics

Wings fully developed. Spontaneous flight has been observed near Boh Solberga (LDN) and many times in the rest of Europe (SEM 1898, p. 77; JNN 1905, p. 172; P.P.E. 1930, p. 272).

\**Pristonychus terricola* Hbst.  
(*subcyaneus* Ill., *Laemostenus terricola*)

Distribution

*Sweden:* In southern and central Sweden widely but very sparsely distributed; much more frequent in the last century. Not found in the southern Swedish highland. Skå, especially in the west, many localities; most recent records: Landskrona, Hilleshög, 1938 (Lewan, ML!); Näsum, 1941 (Sandström, ML!). Ble, probably Karlskrona (MLG 1863, p. 30); Ronneby, around 1928, 2 specimens (LUG, coll. LTH). Små Kalmar (several older collectors!); Fliseryd (WLE). Öld Böda (KHK!). Gtl Lilla-Karlsö, mouth of Grotten, July 13, 1927, 1 specimen (LOH, coll. JNS!). Hll, four localities, even 1940, in Halmstad (FGQ!). In the central Swedish plain several localities: the northernmost: Vgl Vänersborg (MRT 1873, p. 9; HCK, VM); Nke Örebro (JNS!); Vst (certainly Västerås; JHN in litt.); Upl Uppsala, 1905, 1 specimen (WRN); Dlr Säter, 1 specimen (KLF).

*Norway:* Only in the larger cities: 1 Halden; 2 Oslo; 3 Larvik; 5 Kristiansand; 6 Stavanger; 27 Trondheim (N.E.T. 1923, p. 276). Rare and occurs singly.

*Finland:* Only three localities: Ab Åbo (SBC 1834, p. 223; no voucher specimen). Ik Kivennapa (EHN, S.H.A. 1936, p. 196; Må!); Kuolemajärvi (MH!).

*Russian sector:* Not established with certainty, but according to GÜN found in the former Olonetsk province (PPP 1899a, p. 4).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 42). Estonia, among others near Käsmu on the northern coast (SUM 1931; HAB in litt.). Latvia (LCK and MIK 1939). Leningrad region (OBT 1876; BSK 1909, 1929). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 577). Iceland (LTH 1931, p. 174).

*Total area:* Amphi-Atlantic species. In Europe south as far as Portugal (FUE 1920, p. 187), central Italy (LUI 1929, p. 129), Yugoslavia (APF 1904, p. 276). East as far as Volga (JAC 1905–1908, p. 322). The Caucasus (SDR and LDR 1878, p. 68; JAC l.c.). North America, certainly introduced (Leng 1920, p. 63).

Ecology

In our region exclusively synanthropic. The sole exception might be the record of a single specimen at the entrance of a grotto on the small island of Lilla-Karlsö (Gtl), certainly a secondary occurrence. Otherwise it always lives in dark cellars of residential premises and outbuildings, frequently in the center of the city. In the rest of Europe likewise predominantly in cellars. Additionally (even in Denmark) not rare outdoors (SDT 1841, p. 226; 1870, p. 409; LRS 1939, p. 391; Rapp 1933, p. 125; FWL 1887, p. 84), especially in hollow stems

with bird nests (RSB, E.M. 1913, p. 41), in rabbit burrows (JNN 1905, p. 190; Rapp l.c.), in fox and badger burrows (HSN and LRS 1941, p. 121), and once in a molehill (RSB l.c.). Also, especially in France, in grottoes (T.E. 1909, p. 88; JEA 1941–1942, p. 867); this occurrence is probably primary, and I am unable to share the view of LRS (l.c.) that the species was originally a forest animal. It is still not certain whether the species is actually constantly dependent on animal nests (RSB l.c.; West 1940, p. 42; HSN and LRS, l.c.). In cellars it often lives together with species of *Blaps*, which may serve as prey, and rats need not be the source of attraction.

### Biology

The few dated Swedish specimens are distributed through the months of March to September, with most collected in July–August. In Denmark larvae observed in May and June, immature beetles in August and September (LRS 1939, p. 328). According to LRS (l.c., p. 391) the larvae hibernate, as well as a large number of adults, and the species is thus an “autumn breeder”. Further studies are required to ascertain whether this species actually has a regular breeding period. According to BUR (1939, p. 153) insects and isopods serve as prey for the beetle; according to JEA (1941–1942, pp. 865, 867) it feeds on guano.

### Dynamics

Wings constantly stunted (among others, LTZ 1847–1852, p. 151); the rudiment forms an oval scale equal to only one-fifth the length of an elytron. Dispersal takes place without doubt predominantly through displacement by man, as a result of which the species certainly reached, for instance, North America and Iceland.

\**Pterostichus adstrictus* Eschz.  
(*vitreus* Dej., *borealis* Zett.)

### Distribution

(maps in DEV 1930a, p. 109; LTH 1935b, p. 589)

*Sweden*: In the northern Swedish forest region occurs everywhere, south as far as Dlr and Vrm, and in Hls even reaches the coast. Also occurs in the lower parts of the fjeld region, but rare. Southernmost localities: Vrm Arvika (RGS!); Forshaga and Deje on the Klar-älv,† 1933 (Palm and LTH 1937, p. 119!); Vst Bredsjö, June 16, 1936, 1 specimen (LTH); Dlr Ludvika, June 6, 1939, 1 specimen (WSL!); Garpenberg, July 11, 1935, 1 specimen (KLF!); Hls Hornslandet (THS 1868, p. 292; WNG, E.T. 1880, p. 192). Two completely

†(cf. page 522; suppl. scient. edit.).



isolated localities in Små: Burseryd, Hällabäck, together with *Miscodera* and *Harpalus fuliginosus*, May 29, 1936, female (LTH); Lenhovda, male (HGL, coll. LTH).

*Norway*: I. In the fjeld regions of the south, and additionally two localities on the coast: 6 Jæren, Varhaug, 1 specimen (HLS 1915, p. 26); 19 Lærdalsøyri. Delimiting localities toward the southeast: 17 Sirdal (STE, MB!); 16 Rauland (E.T. 1899, p. 295); 14 Torpa; 11 Femundssund (E.T. 1937, p. 119!). II. Trondheim region, only one old record: 28 Verdal, Nes, July 1840 (ZTT, ML!). III. From Province 30 to about latitude 70° N frequent throughout, both on the coast and in the valleys. On the other hand absent on the northernmost peninsulas. Northernmost localities: 35 Torsvåg (SOO, according to STA); 38 Alta (several collectors!); Stabburselv in Porsanger (JEN, according to STA). Also in 41 southern Varanger (several localities and collectors).

*Finland*: North of about latitude 64° N almost universally distributed; farther south gradually becomes rarer. Southernmost localities: Ab Nystad (SDM, MH!); St Yläne (SBJ 1873, p. 102; MH! MÅ!); Ta Hattula (WEG); KI Parikkala (SBJ, MH!).

*Russian sector*: Occurs in the western and southern parts of the Kola Peninsula, east as far as Lv Kaschkarantsa (PPP 1905, p. 94; MH!). In Karelia near Kk Soukelo (PPP l.c.; MH!) and at two localities in Kn: Porajärvi, 1942 (CRP!); Unitsa (PPP 1899a, p. 13; MH!).

599 *Adjacent regions*: Not found in Denmark nor the Baltic States. On the other hand found in the Leningrad region (OBT 1876). British Isles (Joy 1932, p. 364), also Ireland (JHS and HLB 1902, p. 571). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 18). Iceland (LTH 1931, p. 175).

*Total area*: Circumpolar species. In Europe Boreo-British. In Russia, not farther south than Leningrad, in the northeast as far as Pechora (PPP 1907c, p. 308). Siberia (among others, SBJ 1880, p. 28; RM!), east as far as Amur (HEY 1880–1881, p. 35; MDL 1931, p. 5), Lena (PPP 1906b, p. 40), Kamchatka (BNN, NET, SBR 1929, p. 4). Northern Mongolia (PPP 1907d, p. 21). North America, widely distributed (Leng 1920, p. 59; LTH 1935b, p. 589).

## Ecology

In spite of its distribution, which in our region is almost exclusively limited to the high boreal coniferous forest region, this species is far less a forest species than *oblongopunctatus*. It tolerates only moderate shade and certainly lives on forest fringes and in more open forest stands, but primarily on quite open, moderately moist to fairly dry soil, with sparse and not too tall grassy or meadow vegetation. Usually on gravelly soil (moraine) that often shows a considerable admixture of loam or humus. In wooded regions this species must be strongly favored by deforestation and cultivation

(see *Amara torrida*) and hence in our region is actually, to a great extent, almost synanthropic, i.e. occurs on the edges of fields and on farms. Also in northern Norway predominantly on cultivated soil (SPS 1910a, p. 78). In the fields the species regularly reaches the *reg. bet.* (see BRD 1934, p. 233), but is not frequent there; it is missing both in the *reg. alp.* and the tundra.

### Biology

The beetle is found throughout the summer, at the earliest May 14 (Lul) and the latest September 28 (Vbt). Numerous immature beetles found from July 17 (Nbt) to September 28 (Vbt). The beetles undoubtedly hibernate, but it is still not known whether the larvae also do. One specimen was seen feeding on bird droppings (Lys Sorsele, July 1931, GTZ!).

### Dynamics

Wings fully developed. Larger and with a stronger apical part than in *oblongopunctatus*. Spontaneous flight has twice been observed in northern Finland (PFF, N.E. 1942, p. 66; 1943, p. 122).

600

### \**Pterostichus aethiops* Panz.

#### Distribution

*Finland:* Exclusively found in the coastal region of the south within three small, at least apparently well-separated areas. I. Ab Villnäs (MNH, according to SBJ 1873, p. 102; 1 specimen, "Åbo, coll. MNH," MH! is probably a voucher specimen). II. In the Helsinki region, especially in Helsingē parish (several localities and collectors!). III. In the southeast several localities, north as far as Ik Pyhäjärvi (LBG!), west as far as Ka Urpala (SBJ l.c.).

*Russian sector:* Found only in southern Karelia, partly in Sv: north of the mouth of the Swir, 1942 (KHR! PME! PFF!); Kuujärvi and Uslanka, 1943 (PFF); partly in Ko Petrosavodsk, 1884 (PPP 1899a, p. 13; MH!).

Absent in Scandinavia.

*Adjacent regions:* Absent in Denmark. In Estonia widely distributed, also on the northern coast (HAB in litt.; MKK, coll. CRP!). Latvia, widely distributed and not rare (SDL 1872, LCK in litt.). Also in northern Poland (OGI 1931, p. 31). Leningrad region (OBT 1876), also near Lempaala, 1943, 2 specimens (PHJ!). British Isles, montane (Joy 1932, p. 364).

*Total area:* Solely European species. In Central Europe predominantly montane, but in northern Germany extends to the plains on the one hand in the west as far as Hamburg, and on the other hand as far as eastern Prussia (HOR 1941, p. 288). South as far as southeastern France (DEV 1935, p. 51),

southern Austria (HOR l.c.),<sup>34</sup> Serbia (APF 1904, p. 264), Transylvania (PTI 1912, p. 34). In Russia north as far as Yaroslav and Gorki, east as far as Perm (JAC 1905–1908, p. 346). The records from Siberia (among others, SBJ 1880, p. 27; RM!), concern *maurusiacus* Mannh., as shown by TTR (H.E.R. 1897, p. 339).

### Ecology

Apparently everywhere a distinct forest species, in both deciduous and coniferous forests (JNN 1905, p. 167), and in Central Europe it is native mainly in montane regions (E.M.D. 1914, pp. 56, 58; HEB and MEX 1933, p. 107; HOR 1941, p. 287; FWL 1887, p. 63). However, in eastern Germany it is also distributed in the plains (LTZ 1847–1852, p. 198; LNZ 1857, p. 14). It lives in more or less shaded places under moss and leaf litter, and especially prefers to live under the bark of tree stumps.

601

### Biology

In Germany the beetle has been found as early as in February, as late as in November (Rapp 1933, p. 122), and also in its winter quarter (RSH 1842, p. 18). I saw an immature beetle collected on October 3, 1916 (Ik Pyhäjärvi). Adult hibernation might be normal.

### Dynamics

Wings completely stunted, and the extremely slender, pointed rudiment (as seen in one specimen from Finland) does not reach even one-third the length of an elytron.

### Fossil Records

Galicia, early glacial (LMN 1894, p. 32; SCL 1916, p. 50). Bavaria, glacial (FLH 1884, p. 5). Very close to this species (maybe even conspecific?) is the fossil species *primarius* Kolbe (1932, p. 212) from Skå, (?) preglacial.

### \**Pterostichus angustatus* Dft.

#### Distribution

*Sweden*: Very rare, occurring sporadically. One cannot speak of a continuous area. Skå Kämpinge (leg.?, LF!); Stehag, 1881 (MLC, 1 specimen, HM!), 1896

<sup>34</sup>The records from Italy (PTA 1923, p. 159) are doubtful (LUI 1929, p. 1000; PTA 1934, p. 56).



(coll. Roth, 1 specimen, ML!); Bromölla (ROS, 1 specimen, ML!); Herrevadskloster (THS, 1 specimen, ML!); Örkelljunga (Roth, according to MLG 1863, p. 23); Vittsjö (THS 1867a, p. 37), in 1890 collected in large numbers by VNS (several collections!). Ble Karlskrona (ANK, according to THS l.c.; 1 specimen, VA!). Små Kalmar, 1866 (STH, ML!); Klavreström, May 18, 1932, 1 specimen (GTZ, coll. LTH). Hll Släp, Vildmossen, frequent during the years 1906–1908, later not found again (SDN, manuscript, 25 specimens, MG! SLL, 12 specimens, VA!). Vgl, repeatedly found and at many places in the Göteborg region, but always only singly (several collectors, MG!), most recently in September 1921 in Anggårdssbergen and on September 22, 1935 on a road (LTH); Borås region (ÖST, MG!). Ögl (WBG, RM!). Stockholm (NBL 1840, p. 203; Hofgren, VA!). Sdm Skuru, Kungsborg, July 1929, 3 specimens (ING, coll. LTH). Upl Värmdön, Talludden, June 5, 1932, 1 specimen (LTH).

*Norway:* Only one locality on the southern coast: 4 Grimstad, 1 specimen (HLS 1912, p. 5).

602 *Finland:* Very rare, found only in the south in two separate areas: I. In the southwest: Al Jomala, June 1939 (BBG), St Yläne, 1864 (SBJ 1873, p. 102; MÅ!). Ab Sammatti (SAA!). Ni Ekenäs (SBJ l.c.; MH!); Helsinki region, three localities (several collectors!). II. In the southeast: Ik Uusikirkko (LBG). Ka Viborg (MKL, MH!). Sa Joutseno (BLQ). Ki Parikkala (SBJ, MH!).

*Russian sector:* Sv, immediately north of the mouth of the Swir, numerous specimens collected in 1942 (KRH! PME! PFF! N.E. 1943, p. 162). Ko Nurmoila, 1942 (PFF!). Surprisingly the species was never found earlier in the Swir region.

*Adjacent regions:* From Denmark only four old specimens known, respectively from Jylland, Sjælland, Møen, and Bornholm (West 1940, p. 39). Estonia, only 1 specimen near Dorpat, 1838 (SDL 1872; HAB in litt.). Latvia (SDL 1872; BRM 1930; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles, only England (Joy 1932, p. 364).

*Total area:* Euro-Caucasian (possibly Palearctic) species. In Europe predominantly eastern, south as far as Holland and Belgium (EVS 1898, p. 75), central France (DEV 1935, p. 50), northern Spain (FUE 1920, p. 174), northern Italy (LUI 1929, p. 116), Bosnia (APF 1904, p. 259), Transylvania (PTI 1912, p. 33). In Russia north as far as Perm (JAC 1905–1908, p. 341). The Caucasus (JAC l.c.). The record from Siberia is doubtful according to JAC (l.c.), but has been accepted by CKI (1927–1933, p. 624).

### Ecology

The peculiar mode of life of this species is totally opposite those of *Agonum quadripunctatum*. It has been found in our region and in England (E.M.M. 1916, p. 158; 1917, p. 127; 1918, pp. 25–26; 1922, p. 249) and France (*Misc. Ent.*, 27, 1924, p. 64; JEA 1941–1942, p. 762) in burned forest regions. Its occur-

rence in large numbers in the Swir region in 1942 (where the species was not known earlier) was probably the result of fires due to war. In Göteborg it has been found (like *Agonum 4-punctatum*) many times on city roads. The explanation of this extraordinary "dual" ecological existence is probably the same as that for *Agonum 4-punctatum* (see that species). The forests inhabited by this species in our region are sparse pine heaths on poor gravel, with *Calluna* dominant in the ground vegetation. In Mecklenburg a very similar biotope has  
 603 been described (NBG 1933, p. 53). On the other hand, the species has also been found in unwooded marshy land, especially in marginal sandy regions or, at any rate, drier places (E.B. 1927, pp. 93, 94; Peus 1928, p. 577; GRD 1937, p. 44; HOR 1941, p. 284). Finally the species has been found very rarely together with *oblongopunctatus* (NBG l.c.; on the other hand see E.B. 1930, p. 184).

### Biology

Distribution of dated Swedish specimens: IV: 1; V: 2; VI: 24; VII: 9; VIII: 6; IX: 2; X: 1. LRS (1939, pp. 333, 401) presumes on the basis of Danish material, which of course is meager, that the species breeds in autumn and hence hibernates at least predominantly as larva. In Thüringia, however, this beetle was found, among others, in February, March and October (Rapp 1933, p. 117). I am convinced that this species does not deviate from related species (*oblongopunctatus* and *adstrictus*) in this respect and that hibernation as an adult is normal.

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

### \**Pterostichus anthracinus* Ill.

#### Distribution

*Sweden*: Predominantly a southern species, mainly eastern. I. In Skå, Ble, southeastern Små, on Öld and Gtl, rather widely distributed. Delimiting localities here: Skå Kullen (THS, MB!); Harrevadskloster (Roth, E.T. 1896, p. 276); Ble Nyteboda, 1938 (SDH!); Små Skatelöv, 1939, 1 specimen (CHR); Gårdsby, 1923, 1924 (BRD!); Myresjö, 1923, and Öster-Korsberga, 1919 (GTZ!); Virserum (JNS!); Fliseryd, Läggevi, 1932 (LOH!); Påskallavik, 1928 (BRC!). Öld north as far as Hornsjö region (NOT! WRN). Gtl, as far as Bunge, 1942 (BGW!). II. Across central Sweden distribution sparse but probably continuous, somewhat more frequent only in the eastern Mälars region. Delimiting localities: Hll Släp (SDN, 2 specimens, MG!); Vgl, in the

Göteborg region repeatedly found but rare (several collectors!); Alingsås, 1933 (LBÅ); Ögl Tåkern region, not rare (Palm! LTH); Skrukeby, 1933 (LBÅ); Norrköping, Svärtinge, 1926 (WSJ!). Northward: Dsl Mellerud region, 1  
 604 specimen (FBG!); Årtemark, 1938, 1 specimen (LOH, according to JNS); Vrm Arvika (RGS!), 1933 (LTH); Nke Hasselfors, 1936 (LTH); Örebro (JNS!); Vst Västerås (SDN, MG! SLL, VA!); Dlr Hedemora, 2 specimens (RGS!); By, Fullsta, 1943, 2 specimens (Palm!); Gst Gysinge, 1935, 1937, several specimens (Palm! LTH); Upl Älvkarleby, Båtfors, 1938, 1 specimen (Palm); Häverödal, 1936, 2 specimens (LTH).

Absent in Norway and Finland. The old Norwegian records have to be rejected (MST, N.E.T. 1933, p. 271).

*Russian sector:* Only one locality immediately north of the mouth of the Swir, 1942, 4 specimens (KRH, N.E. 1943, p. 163!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) but rather rare (West 1940, p. 40). Estonia, including Ösel (LBÅ 1924b; HAB in litt.); Latvia (SDL 1872), Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 572).

*Total area:* Western Palearctic species. In Europe south as far as southern France (DEV 1935, p. 50), central Italy, Sardinia (LUI 1929, p. 117), Bulgaria (APF 1904, p. 260). Iran (according to CKI 1927–1933, p. 634). The Caucasus (LSH 1936, p. 141). Kirgizia (HEY 1880–1881, p. 33). The record from western Siberia (MKL 1881, p. 20) must be considered uncertain.

### Ecology

Occurs on fresh waters, usually stagnant, for instance, on shores of eutrophic lakes, but frequently also ponds and puddles with non-transparent, foul-smelling water that dries up in summer. Necessary requirements are some shade, usually of deciduous trees or bushes (preferably in deciduous forest meadows), and fat†, humus-rich soil or gyttja†. Ground vegetation often poorly developed or even absent in highly shaded places. In Central Europe the localities are usually likewise shaded by trees (MÖL 1862, p. 90; HOR 1941, p. 285; to the contrary, see GRD 1937, p. 44). The assumption of a greater requirement for limestone than in the case of *nigrita* (Dahl 1928, p. 115) requires verification.

### Biology

Swedish catches: III: 3; IV: 12; V: 24; VI: 34; VII: 10; VIII: 4; IX: 8; X: 1. In Denmark numerous larvae observed from June to the beginning of September, immature beetles from the end of July to the end of October (LRS 1939, p. 333). Spring breeder, hibernating as an adult.

†(cf. pages 587 and 69; suppl. scient. edit.).



Wing dimorphism evident. In the brachypterous form the wings lack an apical reflexed part, and are considerably narrower and smaller than an eylltron. Macropterous individuals are fully winged and capable of flight. Spontaneous flight to light was observed in Hungary (HST, E.N. 1876, p. 79).

#### Fossil Records

Denmark, postglacial (HNR 1933, p. 137). Eastern Prussia, glacial (SPR 1910, p. 118). Galicia, early glacial (LMN 1894, p. 30). Belgium, interglacial (LAP 1903, p. 229).

#### *\*Pterostichus aterrimus* Hbst.

#### Distribution

*Sweden:* Very rare and local, apparently without a continuous area. Skå, several localities, but no specimens recorded in the last twenty years, northernmost near Herrevadskloster (Roth, E.T. 1896, p. 276). Ble Rödeby, Flaken, May 6, 1937, 2 specimens (SDH!). Öld (THS, 1 specimen, ML!), Hornsjö region, 2 specimens (WRN). Gtl Vamlingbo, seashore, June 19, 1934, 1 specimen (JNS!). Små Växjö, 1924 (BRD!), 1931 (CDG); Gårdsby, 1923 (BRD!); Virserum (JNS!); Jönköping, 1869 (POR, 1 specimen, LJ!). Hll Släp (SDN, MG! ÅGR!). Vgl Göteborg, Änggården, very rare (SDN, MG! ÅGR!), Mjörn (ÅGR!). Boh Öckerö, at a small bog swamp ("Moorsumpf") close to the sea, frequent and apparently constantly found (several collectors!). Ögl Stora-Åby, Bonderyd, 1929, 1 specimen (Palm); Tåkern, Svälinge, 1928, 1929, 3 specimens (Palm). Upl Djursholm, Ösbysjön, 1941 and 1942, singly but often found (FIE! LDN! LTH 1943b, p. 144); Sundbyberg, Råstasjön, 1943, dead specimen (LLR). Vst (certainly Västerås region; JHN, 1 specimen, RM!).

Erroneous: Lapland (ZTT 1840, p. 41).

*Norway:* Only two localities in the southwest: 5 Lyngdal (N.E.T. 1920, p. 60); 6 Jelsa in Ryfylke (HMB).

*Finland:* Very rare, only scattered localities in the south, without a continuous area. St Yläne (SBJ 1873, p. 101; MÅ!). Ab Karislojo, Sonnilampi, 1942, repeatedly found (KRG). Ni Hangö (LBG! HLL); Tvärminne (several collectors!). Ka Hogland (HLL, MH!); Seiskari (HLL); Säkkijärvi (SBJ l.c.). Ik Konevitsa (KNG). Kl Salmis (PFF, N.E. 1938, p. 133). Kb Kitee (PME).

*Russian sector:* Only near Kn Solomino (SBJ 1873, p. 101; MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm), in Jylland found only in the east, generally rather rare (West 1940, p. 39). Estonia, three localities including that on Uhtju Island in the Gulf of Finland (HAB in litt.). Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876;

BSK 1908a). British Isles (Joy 1932, p. 363), also Ireland (JHS and HLB 1902, p. 571).

*Total area:* Palearctic species. In Europe predominantly eastern, south as far as northern Spain (FUE 1920, p. 173), northern Italy (LUI 1929, p. 116), Albania (APF 1904, p. 258). Northern Africa (BED 1895–1914, p. 185). Azores (JEA 1941–1942, p. 764). Madeira (CKI 1927–1933, p. 622). Western Siberia (HEY 1880–1881, p. 32; SBJ 1880, p. 26; RM!).

### Ecology

Occurs on the shores of stagnant fresh waters, often at small pools. Always on wet, soft soil with a strong admixture of organic substances, and hence found both on gyttja† on the shores of eutrophic water as well as on marshy soil. Vegetation rich in all kinds of marsh plants, but usually bald wet patches occur in between. The occurrence of the species within the region is conspicuously erratic; usually not found every year at the same place. Often together with *Carabus clathratus*. In our region it is markedly thermophilous, and hence its designation as a “Northern European species” by HOR (1941, p. 283) is quite misleading. The mode of life of this species in the rest of Europe seems to be the same as in our region, except that the species there has specialized for living almost exclusively on marshy soil (for instance, along peat digs) (WLK 1867, p. 9; NBG 1933, p. 52; HOR l.c.; JEA 1941–1942, p. 764; FWL 1887, p. 64). Repeatedly found in the company of *Chlaenius tristis* (B.E.Z. 1861, p. 190; PLZ 1939, p. 5); also in our region (Upl Ösbysjön).

### Biology

Distribution of dated Swedish specimens (catches few of course): V: 26; VI: 6; VII: 3; VIII: 1; IX: 25; X: 1; XI: 1; XII: 1. In Denmark, collected quite predominantly in May (LRS 1939, p. 332). In Germany found in its winter quarter (NBG 1933, p. 52). Undoubtedly a spring breeder, hibernating as an adult.

607

### Dynamics

Wings fully developed. Spontaneous flight observed in Germany (EGG 1901, p. 164). In Finland three specimens found in sea drift (PME 1944, p. 39). The sporadic occurrence of this species indicates good flight capacity.

### Fossil Records

Skå, postglacial, two records (HNR 1933, p. 135). Galicia, glacial (SCL 1916, p. 50).

†(cf. page 69; suppl. scient. edit.).

*\*Pterostichus (Poecilus) coerulescens* L.  
(*versicolor* Sturm, *pauciseta* Thoms.)

Distribution

**Sweden:** Distributed throughout southern and central Sweden and very frequent; in the Norrland coastal region extends as far as the Finnish border; across Jtl and Ång also distributed farther west. The gap in Vbt (north of latitude 64° N) is probably real. Highest or northernmost localities are: Dlr Transtrand, 1937 (RGS!); Orsa, Fryksås, 1937 (TJB!); Hjd Kolsätt (SJB); Jtl Åre (AND, LF!), 1941 (BGW); Ång Tåsjö (CDG, E.T. 1931, p. 163), 1939 (BRC, RM!); Åsl Dorotea, 1936 (LTH); Lyl Lycksele, 1832, several specimens (ZTT 1840, p. 37; ML!); Nbt Älvsbyn, 1930 (LTH and Palm 1934, p. 38!); Edeforsen, 1938 (LTH); Narken, 1938 (LTH); Lul Pålhem, 1940, 2 specimens (LTH); Tol Karesuando, June 24, 1930, 1 specimen (BRC, RM!).

**Norway:** Continuously distributed along the coast; from the Swedish border extends into Trondheim region and in the valleys far into the interior (for instance, as far as 24 Tøllerså-bru, HSS). Northernmost localities: 28 Snåsa (N.E.T. 1937, p. 147); 29 Grong; Overhalden, Ranen (STE, MB!).

Doubtful: 35 Tromsø (SNR 1862, p. 328, "*cupreus*"). A mix-up of locality may have occurred (SPS 1888–1889, p. 107; STA in litt.).

**Finland:** South of about latitude 65° N universally distributed and very frequent (not found only on the islands in the Gulf of Finland). Northern limit of the continuous area runs approximately along the Arctic Circle and is represented by the following localities: Ob Turtola (KNG!); Rovaniemi (KNG!); Ks Paanajärvi (KRG). Quite isolated in the high north near Li Enare, July 1938 (STN).

608 **Russian sector:** In the southern half of Karelia many localities, north as far as Kr Suma (PPP 1899a, p. 13; MH!).

Doubtful: "Lapp. Rossica" (SBJ 1900a).

**Adjacent regions:** In Denmark found everywhere and frequent (West 1940, p. 38). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (among others, SDL 1872). Leningrad region (among others, JAC 1908). British Isles (Joy 1932, p. 363), also Ireland (JHS and HLB 1902, p. 570).

**Total area:** Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 167), central Italy (montane; LUI 1929, p. 114), Albania (APF 1904, p. 254). Northeast as far as Pechora (PPP 1907c, p. 308). The Caucasus (SDR and LDR 1878, p. 70). Siberia (among others, SBJ 1880, p. 24; RM!) extending into easternmost territory (MDL 1931, p. 5). Mongolia (PPP 1906b, p. 39). Japan (according to CKI 1927–1933, p. 590).

Ecology

Highly eurytopic meadow species that occurs on every kind of moderately



moist to somewhat dry soil (loam, sand, gravel, peat, humus) in open situations. As a marked heliophilous species, it prefers places with sparse, often very low vegetation. Especially in wooded areas, it is distinctly favored by culture and lives in particular on paths and edges of fields, railway embankments, on fallows, etc. In the rest of Europe as eurytopic as in our region, probably preferring loamy soil (GRD 1937, p. 44); frequent in high moors (Peus 1928, pp. 577, 669) but cannot possibly be called "tyrrophilous".

### Biology

Southern Swedish catches: III: 10; IV: 41; V: 154; VI: 151; VII: 36; VIII: 44; IX: 22; X: 6; XI: 1; it is thus a distinct spring insect. In Denmark copulation observed in May and June, in our region as late as July 1 (Upl), and numerous larvae from the end of May to the beginning of September (LRS 1939, p. 332). Numerous immature beetles between July 19 (Små) and September 8 (Vgl, Upl). Spring breeder, hibernating as an adult. Observed feeding on a *Cantharis* (Vgl Mösseberg, June 5, 1936, LTH) and a crushed *Phytonomus punctatus* Fbr. (Upl Djursholm, September 5, 1943, LTH).

### Dynamics

Wings fully developed but comparatively weaker than in *cupreus*. The insect 609 might not be a good or regular flier, and there are only three observations of spontaneous flight: Skå Åkarp, 1941 (CHR); Ab Sammatti, May 28, 1943, Karislojo, July 23, 1944 (KRG). At least 6 specimens found in sea drift in Finland (Frey! PME 1944, p. 39).

### Variation

This species is highly variable in color, but the various color forms exhibit no geographic distribution. Dark, more or less nonmetallic specimens are certainly old beetles that have hibernated (twice ?).

### Fossil Records

Galicja, glacial (SCL 1916, p. 50). Saxony, glacial, doubtful identification (NTH 1894, p. 539).

*\*Pterostichus (Poecilus) cupreus* L.  
(*puncticeps* Thoms.)

### Distribution

*Sweden*: From Skå to southern Dlr distributed continuously but somewhat

unevenly. In the southern Swedish highland only a few localities, so that possibly smaller gaps are present; in the central Swedish plain, particularly widely distributed. Northernmost localities: Dsl Steneby, Västra-Növik, 1938 (LOH, according to JNS); Säfte, 1933 (LTH); Alster (ZRN!); Lundsberg, numerous (WRN!); Vst Ramsberg (WHM, according to KLF); Dlr, numerous localities in the southeastern corner, as far as Stora-Tuna (several collectors!) and Falun, Rogsån, 1940, 1 small specimen (TJB!); Gst Storvik, 1935 (KLF! JNS). Doubtful: Ång (Stål, 1 specimen, RM!).

Erroneous: "Lapl.?" (GLL 1896, p. 16).

*Norway*: In the south numerous localities along the coast from the Swedish border as far as 5 Lyngdal. In the eastern valleys north only as far as 2 Ringerike and 10 Sör-Odal (SIE 1875, p. 93; MO!). In the western part of the country only two localities: 6 Bergen; 18 Tangerås in Strandebarm.

Doubtful: 10 Solör; 11 Österdalen; 13 Fron; Sel; Vågå (all according to SIE l.c.: no voucher specimens). *P. cupreus* and *coerulescens* were earlier generally confused with each other.

*Finland*: In the southern half distributed without gaps, rarer toward the north. Northernmost localities: Om Gamla-Karleby (SBJ 1873, p. 97); Haapavesi (HEL, 2 specimens, NL!); Ok Sotkamo (PHJ!).

*Russian sector*: Occurs only in southern Karelia, north as far as Kn Kenjärvi (KNG!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 38). Estonia, including Ösel (HAB 1936a, and in litt.); Latvia (among others, SDL 1872). Leningrad region, among others, near Lempaala, 1943 (PHJ). British Isles (Joy 1932, p. 363), also Ireland (JHS and HLB 1902, p. 570).

*Total area*: Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 166), Corsica (DEV 1935, p. 49), southern Italy, Sardinia, Sicily (LUI 1929, p. 114), Greece and Crete (APF 1904, p. 253). Asia Minor (JEA 1941–1942, p. 749). Syria (according to CKI 1927–1933, p. 594). The Caucasus (SDR and LDR 1878, p. 70). Kirgizia and western Turkestan (HEY 1880–1881, p. 31). Siberia (among others, SBJ 1880, p. 24; RM!), east as far as Lena (PPP 1906b, p. 39).

### Ecology

Often occurs together with *coerulescens* on moderately moist meadow soil. However, it is not quite as eurytopic as that species, but decidedly prefers more or less loamy soil and also requires greater humidity. Furthermore it is not so markedly heliophilous and hence thrives well in taller and denser ground vegetation. Because of these three factors, *cupreus* attains maximum frequency at places where the other species is negligible, i.e., in loamy humid meadows with a rich growth of *Carex* and grass, usually in the vicinity of bodies

of water. *Anisodactylus binotatus* often occurs as successive species. Also found on cultivated soil quite often. In Germany likewise frequent in the vicinity of water bodies (Dahl 1928, p. 113); in Mecklenburg on the other hand the species is stated to be most frequent on dry sandy fields (GRD 1937, p. 44).

### Biology

Swedish catches: II: 1; III: 6; IV: 30; V: 66; VI: 61; VII: 28; VIII: 27; IX: 20; X: 1. Immature beetle found on August 9 (Skå). In Denmark one larva observed at the beginning of August and three immature beetles in the same month (LRS 1939, p. 332). Spring breeder, hibernating as an adult. Both beetles and larvae purportedly feed on insects (BLK 1925, p. 30; BUR 1939, p. 134); on the other hand in England the beetle damages young plants of *Beta* (BUR l.c.).

611

### Dynamics

Wings fully developed, much better than in *coerulescens*. Spontaneous flight observed several times: Ögl Sturefors, April 17, 1942 (LNM!); Nl Lapinjärvi (KNG); also in Germany (GRD 1937, pp. 22, 76) and Hungary (HST, E.N. 1876, p. 79). In Finland two specimens found in sea drift (PME 1944, p. 39).

### Variation

Almost as highly variable in coloration as *coerulescens* and, like that species, these variations show no geographic distribution. Additionally a rare aberrant form with red femora known, with several intermediate gradations. In Sweden I have seen distinctly marked specimens from Skå and Vgl.

### Fossil Records

Holstein, interglacial (Weber 1891, p. 229). England, postglacial (Bell 1922, p. 46).

*\*Pterostichus diligens* Sturm.

(*strenuus* Er., Thoms. nec Panz., *boreellus* J. Sahlb.)

### Distribution

*Sweden*: Found in all provinces; except for the high fjelds, uninterruptedly distributed throughout the country and very frequent especially in the southern half. Northernmost locality: Tol Karesuando, Vittangisaari, 1935 (BRC, RM!).

*Norway*: Except for the extreme northern peninsulas and the high fjelds, continuously distributed throughout the country, certainly also without gaps.



Its absence in the northern part of the western country (Provinces 8 and 9) is certainly only apparent. Northernmost localities: 37 Hammerfest (several collectors!); 40 Tana (MST).

*Finland:* Universally distributed; absent only in the *reg. alp.* Very frequent.

*Russian sector:* Found in the western and southern parts of the Kola Peninsula, east as far as Lv Varsuga (PPP 1905, p. 94; MH!). In Karelia certainly universally distributed, but to date not recorded from the central parts.

*Adjacent regions:* In Denmark found everywhere and very frequent (West 1940, p. 40). Estonia (HAB in litt. Palm! SAA!). Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 572). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 19). Iceland (LTH 1931, p. 176).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 176), central Italy (LUI 1929, p. 117), Bosnia (APF 1904, p. 262). Northeast as far as Pechora (SBJ 1898, p. 339). The Caucasus (SDR and LDR 1878, p. 71). Siberia (among others, SBJ 1880, p. 31; RM!), east as far as Trans-Baikal (MDL 1931, p. 5) and Lena (PPP 1906b, p. 41).

### Ecology

Of all the humidity-loving carabids, this species is the most eurytopic. It lives in almost every humid to wet biotope with some shade and hence is most frequent in forest regions. On the sea found only accidentally. On the one hand occurs on shores of stagnant and flowing, often very small bodies of water, where some shade is provided by trees, shrubs, or tall ground vegetation. It prefers oligotrophic and above all dystrophic waters where, either alone or together with *Bembidion doris*, it is the only carabid found. On eutrophic lakes it falls far behind other carabids in numbers. On the other hand it occurs in humid meadows, in bogs and swamps of every kind, and especially in *Alnus* swamps and in *Sphagnetum* it is often incomparably the predominant carabid; very frequent in all kinds of forest bogs in Finland (RNK 1938, p. 67), as well as hypnum moss bogs ("Braunmoore") and heath moors (PFF 1943, p. 101). The species generally prefers moss-rich places, but on the other hand avoids pure sand and pure loam; otherwise found on every type of soil. In the *reg. bet.* of the fjelds occurs regularly but only locally frequent (N.E.T. 1932, p. 27; BRD 1934, p. 233). In the Swedish *reg. alp.* only very isolated occurrence in the southernmost parts: Hjd (Helags and Tännälen, BRK!), Jtl (Jorm; JNS and Palm, E.T. 1936, p. 184), Lyl (Tärna, Laxfjället, 800 m above sea level, Holm!). On the other hand found in the tundra of the Kola Peninsula, Kildin Island, and Yenisey region (PPP 1910a, p. 324). In Central Europe likewise quite eurytopic (Rapp 1933, p. 122; GRD 1937, p. 44) but apparently, more than with us, particularly in boggy regions, and for that reason it has been designated "tyr-

phophilous" (Dahl 1928, p. 126; Peus 1928, pp. 577, 669; HOR 1941, p. 285).

### Biology

Southern Swedish catches: II: 6; III: 15; IV: 40; V: 107; VI: 172; VII: 79; 613 VIII: 37; IX: 45; X: 23; XI: 10; XII: 3. In Denmark, where it is a more pronounced spring insect, larvae observed from the end of June to the end of September (LRS 1939, p. 334). Numerous immature beetles from July 17 (Skå) to September 18 and November 24 (Vgl), in Finland from the end of July to October (RNK 1938, p. 67), but also in April (Ögl), April 19 (Upl). A spring breeder, hibernating as an adult and only in very rare, exceptional cases in the larval stage.

### Dynamics

Wing dimorphism evident. In the brachypterous form the wings are reduced to a small blunt scale equal to about one-sixth the length of an elytron. As for the macropterous, fully winged form (certainly capable of flight) I have seen only two beetles to date (significantly from the Islands of Fårön and Stora-Karlsö near Gtl). The statement—"Wings usually always developed"—by LTZ (1847–1852, p. 217) from Silesia, is strange.

### Fossil Records

Skå, postglacial and (?) preglacial (HNR 1933, p. 138). Finland (Ik), postglacial (PPP 1911, p. 37). Denmark, postglacial (HNR l.c.). Ireland, undetermined age (Bell 1922, p. 51). Bavaria, glacial (FLH 1884, p. 6).

*Pterostichus (Poecilus) dimidiatus* Ol.: Recorded by GÜN for the former Olonetsk province, but the occurrence within our region is not to be considered established (PPP 1899a, p. 4).

\**Pterostichus fastidiosus* Mannh.  
(*arcticus* J. Sahlb.)

### Distribution

*Russian sector:* Widely distributed in the tundra on the northern coast and in the interior of Kola Peninsula (PPP 1905, p. 95). West as far as Lu Sergej-ostroff; south as far as Lm Lujaur (MH!); east as far as Lj Triostrova (MH!). Absent in the rest of Fennoscandia and all the adjacent regions.

*Total area:* Circumpolar species. In Europe found only in northern Russia: Mezen region (PPP 1908, p. 6), Kanin (PPP 1909, p. 9), Pechora (SBJ

- 614 1898, p. 339; PPP 1907c, p. 308). Siberia (among others, SBJ 1880, p. 31; PPP 1906b, p. 42; 1907d, p. 22), east as far as Bering Strait and Kamchatka (PPP 1906c, p. 195). Northern Mongolia (PPP 1906c). North America, east as far as the Mackenzie River (PPP 1906c).

### Ecology

Within the region occurs exclusively in the tundra. However, even on the Kanin Peninsula and in the Arkhangel'sk region the species lives south of the timber line (PPP 1908, 1909), and in Siberia is widely distributed both in the taiga and the tundra (PPP 1910a, p. 333). There the species seems to be more eurytopic: "in Europe . . . the species is encountered almost always in more humid places, especially under moss and rotting leaves. In the Lena region, however, it is as frequent at the locations just described, but also occurs in drier, sandy places" (PPP 1906c, p. 195).

### Biology

Nothing is known about the periods of development.

### Dynamics

Wings reduced to very small rudiments, as evident in all three specimens from the Kola Peninsula.

### *\*Pterostichus gracilis* Dej.

#### Distribution

- Sweden:* A southern and predominantly eastern species. Two areas, which are probably connected. I. Skå (to date not recorded in the southeast), Ble, southern Små, Öld, and Gtl. Delimiting localities northward: Skå Hälsingborg (VNS, MG!); Små Ryssby, 1923 (GTZ!); Råppe, 1926 (LOH!); Virserum (JNS!); Kalmar, 1865 (STH, coll. THS, ML!). Öld Löt (SJB). Gtl Fardume, 1923 (LTH). II. A broad belt across central Sweden: Delimiting localities: Ögl Norrköping, Svärtinge, 1926 (WSJ!); Linköping, 1924 (GTZ!); Tåkern region, not rare (Palm! LTH); Vgl Hornborgasjön, 1938, 1939 (WGS, ML! WRN); Göteborg (EKB, 1 specimen, SDN, 1 specimen, MG! Strangely the species is not included in SDN's manuscript on beetles of the Göteborg region); Dsl Bolstad, 1933, 2 specimens (LTH); Vrm Säffle, 1933, 1 specimen (LTH); Vgl Otterbäcken, 1936, 6 specimens (LTH); Vst Frövi, 1936 (JNS); Dlr Hedemora (SDN, MG! 3 specimens, RGS!); By, Arnön, 1940, 1 specimen (Palm!); Gst Gysinge, swamp meadow on the river, April 23, 1935, 1 specimen (LTH).
- 165



Erroneous: Nke Hammar; Hls Iggesund (WNG, E.T. 1880, p. 192, = *minor*, KF!).

Norway: Absent.

Finland: A rare species with very restricted distribution. I. Southeast: Several localities in the coastal region between Ab Åbo (SBJ 1873, p. 98; MH!) and Nl Esbo, Kyrkträsk, 1942–1943, numerous (Öller! HLQ!). Additionally in the Näsijärvi region: St Hämeenkyrö (LTV, according to KNG); Ta Pirkkala (GBL); Lempäälä (PTK, MÅ!). II. Two localities in the southeast: Ka Vahviala, Houni (LTV); Antrea (SAA!).

Russian sector: Only in the region where the Swir River empties, but repeatedly found (PPP 1899a, p. 13; PME! PFF!).

Adjacent regions: In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 40). Estonia, only in the southeast (HAB in litt.); Latvia (SDL 1872). Leningrad region (MAS 1902). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 572).

Total area: Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 175), Corsica (DEV 1935, p. 50), southern Italy, Sardinia (LUI 1929, p. 117), Albania (APF 1904, p. 261). The Caucasus (LSH 1936, p. 141). Kirgizia (JAC 1905–1908, p. 342). Eastern Siberia (HEY 1880–1881, p. 33; JAC l.c.).

### Ecology

Occurs on shores or in the vicinity of stagnant fresh waters (rarely slow-flowing waters). It requires a marked admixture of loam in the soil and rich vegetation of species of *Carex*, *Glyceria spectabilis*, and the like. In our region occurs primarily on larger eutrophic lakes, but often in places where extensive swamp meadows border the shores, at a considerable distance from water; sometimes also at very small drain holes or pits, which dry up in summer. At very wet places, but with more or less firm ground. Also found in riparian forests (e.g., Ögl Tåkern), but these are possibly winter quarters since the species otherwise does not seem to tolerate as much shade as *anthracinus*. In Central Europe biotopes apparently the same as in our region (NBG 1933, p. 53).

### Biology

Distribution of dated Swedish specimens: III: 5; IV: 15; V: 45; VI: 36; VII: 10; VIII: 4; IX: 3; X: 16. In Denmark, a still more pronounced spring insect (LRS 1939, p. 333). Immature beetles collected on August 15 (Sdm) and numerous in October (Ögl); additionally, however, one specimen collected on March 15, 1926 (Ögl). Spring breeder, normally hibernating as an adult and only in rare exceptional cases in the larval stage.

## Dynamics

Wings fully developed, comparatively larger than in related species. Spontaneous flight to light observed in Hungary (HST, E.N. 1876, p. 79) and the Caucasus (LSH 1936, p. 141). In Finland 7 specimens found in sea drift (PME 1944, p. 39).

## Fossil Records

Skå (?) preglacial (HNR 1933, p. 137). Galicia, glacial (SCL 1916, p. 50).

*Pterostichus (Poecilus) koyi* Germ., *marginalis* Dej.: Erroneously recorded from Finland (N.E. 1934, p. 126; S.H.A. 1935, p. 64; see N.E. 1935, p. 90). Also the occurrence in Russian Karelia (according to GÜN) must be considered doubtful (PPP 1899a, p. 4).

\**Pterostichus (Poecilus) lepidus* Leske.

## Distribution

*Sweden:* From Skå to the Finnish border probably continuously distributed and, except for Vst and Gst found in all provinces. However, the distribution is strikingly uneven: the species is most frequent in the southwest, but on the other hand on Öld and Gtl, and above all in the central Swedish loamy region, rare. Absent in the fjelds and most parts of the forest region of Lapland. Highest localities: Vrm Långflon, 1933 (Palm and LTH 1937, p. 119!); Dlr Idre, 1925, 1926 (Sthen, coll. FRL!); Hjd Vemdalen, 1913 (LBL, RM!); Jtl Ragunda (FRI, VA! coll. SJB); Ång Tåsjö (CDG, E.T. 1931, p. 163); Åsl Åsele, 1884, 1886 (TIM, LU!); Lyl Lycksele (ZTT 1840, p. 41), 1936, 3 specimens (LTH); Vbt Kusfors, 1930 (LTH and Palm 1934, p. 38!); Nbt Älvsbyn (LTH and Palm, l.c.); Edeforsen, 1938 (LTH); Lakaträsk, 1940 (LTH); Pajala, 1941 (SJB); Lul Jockmock, 1924 (LTH); Ullatti and Hackas, 1938 (LTH).

617 Doubtful: Stockholm (Hofgren, VA! 1866, VYL, ML!).

*Norway:* In the south occurs throughout as far as Trondheim Fjord, except in the extreme western part of the country and the actual fjelds. In the inner western part of the country near 7 Bergen (SPS 1901, p. 38) and 20 Veblungnes. Northernmost localities: 28 Stjördal (N.E.T. 1923, p. 276; 1937, p. 147); Tynes and Nes in Verdal, July 1840 (ZTT, ML!).

*Finland:* On the mainland almost universally distributed south as far as about latitude 65° N. However, the species is missing on Åland and in the Skärgård east of it; among the islands in the Gulf of Finland only 1 specimen has been found in Seiskari (THG!). Northernmost localities: Lk Muonio (SBJ 1873, p. 97); Ob Turtola (KNG); Rovaniemi (WEG); Ks Paanajärvi (STN! PFF 1943, p. 122).

*Russian sector:* Lm Kantalaks (PPP 1905, p. 94); Kc Kem (PPP 1899a, p. 13; MH!). Otherwise found only in southern Karelia, numerous localities.

*Adjacent regions:* In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 38). Estonia, including Ösel (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 363), also Ireland (JHS and HLB 1902, p. 570).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 166), central Italy (montane; LUI 1929, p. 114), Bulgaria (APF 1904, p. 253). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 308). Kirgizia (HEY 1880–1881, p. 31). Siberia (among others, SBJ 1880, p. 24; RM!), east as far as Amur (HEY l.c.).

### Ecology

A markedly xerophilous species. Lives on open, sun-exposed sand or sandy gravel (moraine, "Rullstens" gravel), at most with a very slight admixture of loam (in solely loamy regions the species is totally absent). It requires sparse vegetation, preferably only in patches (*Festuca ovina*, *Calluna*, *Scabiosa arvensis*, *Rumex acetosella*, and so forth), but is absent in totally barren quicksand. It otherwise prefers sandy fields at the sea. It tolerates only slight shade, for instance, at forest fringes or very sparse pine heath. In the rest of Europe also always found on sand or gravel.

### Biology

Southern Swedish catches: III: 2; IV: 1; V: 20; VI: 66; VII: 48; VIII: 33; IX: 1; 618 X: 2; definitely a midsummer animal. In Denmark maximum abundance in July (LRS 1939, p. 332). Numerous immature beetles found from June 27 (Upl) to July 22 (Dsl) and July 30 (Lul). Undoubtedly an autumn breeder, hibernating predominantly in the larval stage (LRS l.c.; p. 400). In Central Europe the beetle purportedly damages forest seeds (BLK 1925, p. 30; BUR 1939, p. 136) but might, however, be primarily carnivorous.

### Dynamics

Wing dimorphism evident (SHM 1860, p. 448; JEA 1941–1942, p. 753), and according to MÜL (1926, p. 210) polymorphism. In the brachypterous form examined by me the wings are reduced to a narrow triangular rudiment equal to, at most, one-third the length of an elytron. Macropterous beetles have fully developed wings (comparatively at least as large as in *coerulescens*), which are probably functional. However, flight observations absent.



## Variation

This species is even more variable in color than *cupreus* and *coerulescens*, especially in the southern parts of the region. Pure blue or emerald-green beetles are especially prominent in Sweden only in the coastal regions of the south (north at least as far as Gtl and Vgl). WHF's contention (1881, p. 24) that the copper-colored beetles belong more to the plains and the greenish ones more to the forests, is not substantiated in our region.

## Fossil Record

England, age undetermined (Bell 1922, p. 46).

*Pterostichus madidus* Fbr.  
(*concinus* Sturm.)

Distribution  
(map in DEV 1930a, p. 129)

*Finland*: NI Ekenäs, July 1937, 2 specimens, at the sea, on rather dry grassy soil (BRK, N.E. 1943, p. 61!). Very probably an accidental occurrence.

Absent in the rest of Fennoscandia.

619 *Adjacent regions*: In Denmark near Halk and Randers in eastern Jylland, 1 specimen each, in the previous century (West 1940, p. 40). Not known in the eastern Baltic region. However, it is possible that the species recorded by ULN (1884, p. 12); as "*Feronia maura* Dft." (in addition to "*v. madida* Sturm") from eastern Latvia actually belongs to *P. madidus*. British Isles (Joy 1932, p. 364), also frequent in Ireland (JHS and HLB 1902, p. 570).

*Total area*: Solely European species, markedly western. Spain (FUE 1920, p. 178; DEV 1930a, p. 129; map; on the other hand, according to JEA 1941–1942, p. 807, on the Iberian Peninsula only other species found). France, universal (DEV 1935, p. 51). Doubtful in Italy (PTA 1923, p. 159; see also LUI 1929, p. 1000; PTA 1934, p. 55). Austria, Lower Arlberg (HOR 1941, p. 287). Holland (EVS 1898, p. 77). Western Germany, north as far as Hannover, east as far as Harz and Saxony (HOR l.c.), additionally one isolated locality (2 specimens) in Mecklenburg (GRD 1937, p. 52). According to JAC (1905–1908, p. 346), east into Podolia, which is probably incorrect.

## Ecology

In Central Europe seems to be predominantly a forest species (RSH 1842, p. 18; GAL 1883, p. 298; Rapp 1933, p. 123), which purportedly prefers limestone soil (WHF 1881, p. 26; Dahl 1928, p. 120).

### Biology

Periods of development not known. In Central Europe copulation has been observed both in spring and autumn (BUR 1939, p. 136). From England there are reports of damage to strawberries, young rape plants, and cereals (BUR l.c).

### Dynamics

Wings stunted ("aptère," JEA 1941–1942, p. 807). The wing rudiment (as seen in one specimen from France) forms an extremely small scale not visible to the naked eye; additionally, the elytra are fused along the suture.

### Fossil Records

England, interglacial (Bell 1888, p. 2; 1922, p. 46; Reid 1890, p. 231). Belgium, interglacial (LAP 1902, p. 552; 1903, p. 229).

620

\**Pterostichus middendorffi* J. Sahlb.  
(*deplanatus* Motsch., *théeli* Mäkl.)

### Distribution

*Russian sector:* Exclusively in the eastern part of the Kola Peninsula, three localities (PPP 1905, p. 95; MH! MÅ! and other collections).

Absent in the rest of Fennoscandia and all the adjacent regions.

*Total area:* Palearctic species. In Europe not found outside the region. In Siberia apparently continuously distributed from Yenisey (among others, SBJ 1880, p. 30) as far as Lena (PPP 1906b, p. 41) and Jena (PPP 1906c, p. 39). In Yenisey region south even as far as latitude 62° N (PPP 1906c).

### Ecology

Within the region found only in dry places of the tundra (PPP 1905). In Siberia predominantly in the forest region and only rarely in the tundra (PPP 1906c). Lives "especially under stones on sandy and dry riverside slopes with little vegetation" (PPP 1906b; 1906c).

### Biology

Periods of development not known. On the Kola Peninsula found in July and August.

## Dynamics

Wings (as seen in one specimen from Kola Peninsula) completely stunted to a small scale.

*\*Pterostichus minor* Gyll.

## Distribution

*Sweden:* From Skå to the Finnish border probably uninterruptedly distributed, although to date not found in Ång. Otherwise known from all provinces, except Hjd. In southern and central Sweden frequent throughout, becoming scarcer toward the north, and completely absent in the fjelds (except Jtl Åre) as well as  
621 in most parts of the forest region of Lapland. Highest localities: Vrm Vingäng, 1933 (Palm and LTH 1937, p. 119!); Dlr Lima, Harptjärn, 1942, 1 specimen (OLS); Mora (RGS!); Hls Los (SJB); Ramsjö, 1943 (LDN!); Jtl Hackås, 1942 (BGW); Åre (1840, ZTT, ML! SDN, 2 specimens, MG!); Åsl Dorotea, 1884 (TIM, 2 specimens, LU!), 1936, 4 specimens (LTH); Lyl Sorsele, Gargnäs, 1928, 2 specimens (GTZ, E.T. 1932, p. 54!); Pil Arvidsjaur, 1925, 1 specimen (LTH); Lul Pålkem, 1941, 1 specimen (WRN); Nbt Karl-Gustav, 1941 (SJB).

*Norway:* I. In the southeast widely distributed and frequent, north as far as 12 Gjövik and Løten, west along the coast as far as 4 Risör (MO!). In the extreme south near 5 Mandal. Then in 6 Jæren and Ryfylke, widely distributed (HLS 1915, p. 26); near 7 Bergen, two localities (SPS 1875, p. 21; 1901, p. 40). All these southern localities probably form a continuous area. II. The area in Trondheim region is isolated and in direct continuity with the Swedish area in Jtl: 26 Hitra; 27 Trondheim, among others, on Jonsvatn; 28 Frosta; Meraker (LYS, N.E.T. 1923, p. 276; 1937, p. 147).

*Finland:* South of about latitude 63° N universally distributed and frequent; farther north occurs sparsely and found to date only in the inland. On the western coast north only as far as Om Jakobstad (SBJ, MH!). Northernmost localities otherwise: Ob Ylitornio (RNK, MER, MÅ! Rovaniemi (WEG); Ks Kuusamo (Frey, MH!); Ok Ruhtinassalmi (SSK, MH! MÅ); Ristijärvi (HLL, MH!).

*Russian sector:* One (or two) locality in northern Karelia: Kk Koutajärvi (SBJ 1873, p. 99); Soukelo (SBJ, MH! Possibly the same locality?). In southern Karelia numerous localities.

*Adjacent regions:* In Denmark everywhere and very frequent (West 1940, p. 40). Estonia (HAB in litt.; Palm!); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 572).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1902, p. 175), Corsica (DEV 1935, p. 50), central Italy (LUI 1929, p. 117), Greece (OTZ 1886, p. 211). The Caucasus (SDR and LDR 1878, p. 71; LSH 1936, p. 141). Western Siberia (SBJ 1880, p. 26; RM!).



### Ecology

A very eurytopic swamp and riparian species. Lives at waters of every kind, stagnant as well as flowing, large and very small; at the sea, however, occurs only accidentally. Additionally, found in swamps and bogs, also in places where  
 622 no open body of water occurs in the vicinity. On loam, peat, and humus (on sand and gravel if an admixture of loam or humus is present); especially on wet, soft ground, for instance found constantly at places where *Comarum* grows. Some vegetation, usually rich, must be present as the species prefers more or less shaded places, although tall vegetation suffices. The species attains maximum frequency in bog forests (see RNK 1938, p. 67), especially with *Alnus glutinosa*, or at lakeshores of a similar nature. Also in wet *Sphagnum*, e.g., at dystrophic lakes, constant in occurrence but not as frequent as *diligens*. This species further differs from *diligens* in occurring at markedly eutrophic lakes, often in large numbers, and hence is a more eurytopic riparian species. In Central Europe likewise a eurytopic species, which does not deserve the label "tyrphophilous" (ROU 1934, p. 74). According to Dahl (1928, p. 116) it is dependent on "humic acids".

### Biology

Southern Swedish catches: I: 2; II: 2; III: 9; IV: 39; V: 84; VI: 120; VII: 47; VIII: 15; IX: 18; X: 10; XI: 4. In Denmark maximum abundance already in May, and numerous larvae observed from July to the beginning of October (LRS 1939, p. 333). Numerous immature beetles collected between August 15 (Sdm) and October 20 (Upl), but also two specimens on May 10, 1940 (Gtl). Spring breeder (LRS l.c., p. 402), hibernating as an adult and only in rare exceptional cases in the larval stage.

### Dynamics

Wing dimorphism evident or, more correctly, polymorphism, since there are at least three main types. In the first type the wings lack an apical reflexed part and are narrower than and, above all, far shorter than the elytra (about two-thirds the length of an elytron). The second form, which is rather variable, of course has a reflexed apical part, but the wings are so small that they cannot be functional. The third form is fully winged and certainly capable of flight. There are no observations on flight, however, but numerous specimens have been recorded in sea drift in Finland (Frey 1937, pp. 410, 437; STÅ 1938, p. 19; PME 1944, p. 39). SDN (manuscript) reports its occurrence in large numbers under seaweed on the seashore near Hll Onsala, June 1889.

## Fossil Record

France, postglacial (LSN 1925, p. 948).

623

\**Pterostichus niger* Schall.

## Distribution

(map in LTH 1939a, p. 249)

*Sweden*: South of about latitude 60° N frequent everywhere, but farther north occurs only in lower regions and continuously distributed as far as southern Vbt. Northernmost or highest localities are: Vrm Östmark, 1911 (SAA!); Dlr Mora (KHG!); Hls Ljusdal (SJB); Mdp Ånge, 1923 (Holm, coll. LTH); Jtl Storsjö region, 1923, 1936, 1941, three localities (FHL! LTH; BGW); Ragunda (FRI, 3 specimens, VA!); Ång Långsele, 1924, 1930 (LTH); Örnköldsvik, 1936, 1 specimen (LTH); Vbt Umeå, 1936, 1 specimen (LTH); Holmsund, 1936, 1 specimen, 1 fragment (LTH). In Nbt, on the Torne-älv, two localities as advance posts of the Finnish area: Karungi, 4 specimens, Vitsaniemi, 1 specimen, 1930 (LTH and Palm 1934, p. 39!).

Erroneous: Lapland (ZTT 1828, p. 31; 1840, p. 39; GLL 1896, p. 17; no voucher specimen).

*Norway*: Occurs everywhere in the coastal region and the valleys of southern Norway, and northward continuously distributed almost as far as the Arctic Circle. Northern limit represented by the following localities: 31 Lökta (STE, MO!); Hemnesberget (STE, MB!); 32 Hammernes in Mo (STE, MB!). The isolated occurrence at 35 Hillesøy, June 1887, 10 specimens (SPS 1888, p. 25; 1888–1889, p. 108; 1910b, p. 140) is very strange.

*Finland*: Distribution continuous and without gaps well as far as latitude 65° N, but less frequent in the north. Northernmost localities: Ob Torneå (LBG!); Kemi (EHN, MÅ!); Pudasjärvi (NSL); Ok Ruhtinassalmi (SSK, MÅ!).

*Russian sector*: Only in southern Karelia, north as far as Ko Petrosavodsk (PPP 1899a, p. 13; MH!).

*Adjacent regions*: In Denmark found everywhere and frequent (West 1940, p. 39). Estonia, including Ösel (HAB 1936a, and in litt.; SAA! Palm!); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 571). Shetland (West 1930, p. 75).

*Total area*: Palearctic species. In Europe south as far as central Spain and the Balearic Islands (FUE 1920, p. 174), Corsica (DEV 1935, p. 50). Southern Italy, Sardinia (LUI 1929, p. 116), Greece (OTZ 1886, p. 211). In the northeast as far as Pechora (SBJ 1898, p. 339). Iran (BOD 1927c, p. 41). The Caucasus (CHD 1846, p. 148; SDR and LDR 1878, p. 70). Western Turkestan (HEY 1880–1881, p. 32). Siberia (among others, SBJ 1880, p. 26; RM! MDL 1931, p. 5), east as far as Lena (PPP 1906b, p. 40) and Kamchatka (BNN, NET,

624

SBR 1929, p. 4). In eastern Siberia apparently only the subspecies *planipennis* R.F. Sahlb. (*rapax* Motsch.) is found.

### Ecology

Predominantly a forest species. Requires moderate soil moisture and some shade, usually of trees, but also of tall meadow and weedy vegetation. Apparently also requires a more or less marked admixture of humus in the soil, but is otherwise not dependent on soil properties. It is most frequent in moderately humid and dense deciduous or mixed forests, with poorly developed ground vegetation, under leaf litter, moss, under bark of decaying stumps, etc.; usually together with *oblongopunctatus*. Also occurs on shaded shores, especially under *Alnus glutinosa*. This species is in no way shy of culture; it often lives in gardens and parks; however, in contrast to *vulgaris*, it can hardly be considered favored by culture. In Central Europe likewise eurytopic and occurs chiefly in deciduous forests (BLK 1925, p. 31; Rapp 1933, p. 117; GRD 1937, p. 44). Avoidance of limestone (Dahl 1928, p. 119) is not evident in our region.

### Biology

Southern Swedish catches: II: 3; III: 5; IV: 18; V: 76; VI: 97; VII: 70; VIII: 68; IX: 24; X: 6; XI: 0; XII: 1. In Denmark the beetles are rather uniformly distributed over the summer months in spite of August, when there is a maximum abundance; larvae found in all months of the year, but most numerous in November (LRS 1939, p. 333). Numerous immature beetles found between June 18 (Vst) and July 20 (Små). It is undoubtedly an autumn breeder, hibernating in the larval stage (LRS l.c., p. 401), but the number of hibernating adults is so large that further studies are mandatory to ascertain whether they reproduce twice. In our region this species, like *vulgaris*, has been observed as a pest of strawberries (LBL 1927, p. 13). In captivity feeds on bread (Boh, LTH) but normally certainly carnivorous.

### Dynamics

Wings in our material constantly fully developed, but not very large compared to the body. From the rest of Europe there are two observations on flight: 625 Hungary (HST, E.N. 1876; p. 79); Podolia (PJT, E.A. 1929, p. 456) and it is therefore likely that the species in our region too can fly (earlier denied by me; LTH 1939a, p. 249). Flight for this species must, however, be a very rare phenomenon (not one specimen in the very extensive Finnish sea-drift material) and it is doubtful if any biological significance for dispersal can be attributed to it. Possibly dimorphic in Central Europe. LTZ (1847–1852, p. 204) wrote: “wings more or less reduced, rarely longer than the elytra”; JEA



(1941–1942, p. 785) has labeled this species “brachyptère”.

### Fossil Records

Skå, postglacial and (?) late glacial; Denmark, postglacial (HNR 1933, p. 135). England, postglacial (Bell 1922, p. 46). France, postglacial (LSN 1918a, p. 398; 1918b, p. 538; 1925, p. 948). Galicia, glacial (SCL 1916, p. 50).

### *\*Pterosticus nigrita* Fbr.

#### Distribution

**Sweden:** Except for the actual fjelds, distributed throughout the country and in all provinces, except Hjd. The small gap in Ång is undoubtedly due to insufficient investigation. Highest localities: Dlr Särna (AND, LF); Jtl Ånn, 1934, 3 specimens (LTH); Enafors, 1923 (BNG, ML!); Jorm, two localities, 1932, 2 specimens (JNS and Palm, E.T. 1936, p. 184! Åsl Saxnäs, 1939, 1 specimen (NST, coll. LTH); Lyl Stensele, Fjällsjönäs, 1930, 2 specimens (Ågren; E.T. 1932, p. 54; coll. GTZ!); Pil Jäckvik, 1925, 1 specimen (LTH); Lul Randijaur, 1843 (BOH, manuscript in K.V. Ak., “*anthracinus*”); Luleluspén, 1923, 1 specimen (FRL!); Tol Juckasjärvi (ZTT 1840, p. 39), 1932 (BRD!); Vittangi, 1938, 3 specimens (LTH).

**Norway:** Except for the fjelds, distributed without gaps from the extreme south as far as almost latitude 70° N. Northernmost localities: 36 Målselv, three localities (N.E.T. 1932, p. 27; STA in litt.); 35 Finnsnes (SPS, according to STA); Tromsø (SNR 1862, p. 328; questioned by SPS 1888–1889, p. 108); 36 Nordreisa (STE, MB!).

626 **Finland:** South of the Arctic Circle universally distributed, farther north sparser. Northernmost localities: Lk Muonio (SBJ 1873, p. 98; MH! RNK); Kittilä (SAA, MH!); Kairila (STN); Li Ivalojoiki and Tsitsanjarga (PPP 1905, p. 94; MH!); Lp Yläluostari, July 4, 1929 (LNN, MÅ!).

**Russian sector:** On the Kola Peninsula only along the southern coast, east as far as Lv Tschavanga (PPP 1905, p. 94; MH!). In Karelia certainly occurring everywhere but to date not recorded in the inner parts; frequent in the south.

**Adjacent regions:** In Denmark everywhere and very frequent (West 1940, p. 39). Estonia, including Ösel (SUM 1931; HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 572). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 18). Iceland (LTH 1931, p. 176).

**Total area:** Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 174), Corsica (DEV 1935, p. 50), southern Italy, Sardinia, Sicily (LUI 1929, p. 116), Greece (APF 1904, p. 260). In the northeast as far as Pechora (SBJ 1898, p. 339). Asia Minor (JAC 1905–1908, p. 342). The Caucasus (SDR and LDR 1878, p. 79). Western Turkestan (HEY 1880–1881, p. 33). Siberia (among others, SBJ 1880, p. 26; RM!), east as far as Lena (PPP 1906b,

p. 40) and Kamchatka (HEY l.c.).

### Ecology

Highly eurytopic riparian species that lives at fresh waters of all kinds (often very small bodies of water); rarely at the sea. It has little dependence on soil conditions but avoids pure sand and gravel, since it always requires an admixture of loam and humus. It is likewise absent on totally barren shores. Some shade, often from only tall ground vegetation, is necessary. At eutrophic lakes it is more frequent than *diligens*, but at dystrophic lakes lags behind the latter species; however, it also lives in *Sphagnum*. This species attains maximum abundance on *Carex* shores on more or less loamy soil. Like *minor* and *diligens*, it also occurs at wet places, distant from open water, for instance in *Alnus glutinosa* swamps and peat bogs (in large numbers in Finnish forest bogs; RNK 1938, p. 67), but here is always superceded in number by the other two species. Also occurs in wet meadows. In Central Europe likewise markedly eurytopic (see Rapp 1933, p. 119; GRD 1937, p. 44). Regular inhabitant of high moors in Germany (Peus 1928, p. 577).

627

### Biology

Southern Swedish catches: I: 2; II: 2; III: 14; IV: 58; V: 124; VI: 165; VII: 68; VIII: 56; IX: 39; X: 15; XI: 0; XII: 1. In Denmark maximum abundance in May, and very numerous larvae observed from the end of May to the end of September (LRS 1939, p. 333). Numerous immature beetles found between July 10 (Dsl), July 11 (Vbt) and September 15 (Vgl), and additionally one in May 1943 (Ögl). Spring breeder, hibernating as an adult, and only in very exceptional solitary cases in the larval stage.

### Dynamics and Variation

Wings fully developed and always with a reflexed apical part which, however, varies in degree of development. In small, broadly built individuals with comparatively short, laterally more rounded elytra, the wings are poorly developed, especially their apical part. It is apparently this form which was given the name *rhaeticus* Heer. It is especially well represented both in our region in the north, and everywhere in *Sphagnum*; however, there is no definite demarcation, be it morphological, geographic, or ecological; there are many intermediates. It has not been established whether the true *rhaeticus* is capable of flight, and the species *nigrita* on the whole might be a comparatively rare flier. Only a single observation of spontaneous flight is known: Små Gårdsby, May 21, 1943, male (BRD!). Nevertheless numerous specimens have been found in sea drift in Finland (Frey 1937, pp. 410, 437; STÅ 1938, pp. 19, 20; PME 1944, p. 39).

## Fossil Records

Skå, postglacial (HNR 1933, p. 136). Finland (Ni, Sa), postglacial (PPP 1911, p. 37). Denmark, postglacial, (?) late glacial, interglacial (HNR l.c.). The Faeroes, undetermined age (JSS and RSS 1922, p. 13). Ireland, undetermined age (Bell 1922, pp. 46, 51). Switzerland, glacial (Heer, according to HNR l.c.). Galicia, glacial (SCL 1916, p. 50).

\**Pterostichus oblongopunctatus* Fbr.

## Distribution

Sweden: Except for Hjd, found in all provinces, and south of about latitude 62° N almost universally distributed (in southern Skå, however, not recorded to date). Farther north becomes notably scarcer, occurring mainly in the coastal region; in Lapland only very solitary localities, but distributed as far as the Finnish border. Highest localities: Dlr Idre 1925 (coll. FRL!); Jtl Ånn, 1934, two localities (LTH); Enafors, 1888 (coll. GLL, SA!); Jorm, Vallån, 1932, 5 specimens (Palm and JNS, E.T. 1936, p. 184!); Ång Tåsjö, 1939, 1 specimen (BRC, RM!); Åsl Dorotea, 1936, 1 specimen (LTH); Vilhelmina, 1936, 2 specimens (LTH); Lyl Tärna, Laxfjäll, 1937, 1 specimen (Holm, coll. LTH); Gäutavardo, June 16, 1939 (LDV!); Sorsele, 1919, 2 specimens (GTZ, E.T. 1932, p. 54!); Lul Gällivare, Kuosakåbbå, July 13, 1932, 1 specimen (RDB, ML!); Nbt Harads, 1938, numerous (LTH); Vitsaniemi, 1930, 1 specimen (LTH and Palm 1934, p. 39!). Doubtful: Lyl Storuman (ZTT 1840, p. 40; see LTH 1938, p. 19).

Norway: Not found in the actual fjelds, but otherwise distribution continuous and without gaps from the extreme south to almost latitude 70° N. Northernmost localities: 35 Tromsdal, June 29, 1888, 1 specimen (SPS 1888–1889, p. 109); 36 Horsnes (according to STA); 38 Alta, June 1924, 1 specimen (MST, MO!).

Finland: South of about latitude 65° N universally distributed, farther north much less so and occurs at widely separated localities. Northernmost: Ks Paanajärvi (PFF 1943, p. 122); Lk Muonio (SBJ 1873, p. 102; SAA 1917, p. 284); Sodankylä (SUD, MH!); Li Ivalo (HLL, MH!).

Erroneous: Lp Petsamofjord (LBÅ 1933, p. 117, = *adstrictus*!).

Russian sector: Lt Lutto (PPP, MH!). In southern Karelia frequent, north as far as Kn Semsjärvi (CRP!).

Adjacent regions: In Denmark universal and frequent (West 1940, p. 39). Estonia, including Ösel (HAB 1936a and in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 364), also Ireland (JHS and HLB 1902, p. 571). Shetland (West 1930, p. 75).

Total area: Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 173), central Italy (montane; LUI 1929, p. 116), Bulgaria (APF



1904, p. 258). In the north-east as far as Pechora (SBJ 1898, p. 339). The Caucasus (SDR and LDR 1878, p. 71). Siberia (among others, SBJ 1880, p. 28; RM!), east as far as Trans-Baikal (HEY 1880-1881, p. 35). According to JEA (1941-1942, p. 762) also found in Japan.

### Ecology

Very predominantly a forest species that is found in Sweden only under the shade of trees or shrubs; on the other hand in western Norway lives surprisingly  
629 in open terrain as well (SPS 1875, p. 21). First and foremost requirement, distinct layer of humus overlying gravel, loam, or peat (more rarely sand). The species prefers forests with a rich carpet of *Hylocomium* and other mosses, but is otherwise fairly independent of ground vegetation. In deciduous and mixed forests, and also in almost pure spruce forests (SAA 1917, p. 284), occurs on moderate to very moist soil; in wet forest swamps occurs only sporadically; for instance, in Finnish forest bogs very sparse (RNK 1938, p. 67). Among moss, in leaf litter, and especially under bark of rotting tree swamps. In Sweden the fjeld region is reached only in Jtl and Lyl (Tärna) and the coniferous forest timber line not crossed; in northern Norway also found in the *reg. bet.* (SPS 1888-1889, p. 109; 1910a, p. 78; STA in litt.); never found above the timber line. In Central Europe likewise an exclusive forest species (see LRS 1939, p. 401; West 1940, p. 39; FRH 1897, p. 8; GRD 1937, p. 44; JEA 1941-1942, p. 762). According to Dahl (1928, p. 118) the species requires "humic acids".

### Biology

Southern Swedish catches: II: 2; III: 15; IV: 42; V: 121; VI: 148; VII: 61; VIII: 35; IX: 40; X: 4; XI: 2; XII: 1. In Denmark numerous larvae observed from the end of June to the beginning of September (LRS 1939, p. 332). Numerous immature beetles found from August 13 (Skå) to October 17 (Stockholm), but even earlier, another 3 specimens, respectively April 12 (Dlr), May (Upl), and June 3 (Dlr). Spring breeder, hibernating as an adult; exceptionally, however, the larvae of this species, like those of *Pterostichus (diligens, gracilis, minor, nigrita)* may also hibernate.

### Dynamics

Wings fully developed, but much shorter than in *adstrictus*, especially the apical part. My attempts to induce flight upon exposure to sun were not successful. Nevertheless the species is probably capable of flight though certainly neither a good nor regular flier. In the sea-drift material from Finland only two beetles were found (PME 1944, p. 39).

## Fossil Records

Skå and Denmark, postglacial (HNR 1933, p. 135). Bavaria, glacial (FLH 1884, p. 5). France, postglacial (LSN 1925, p. 948).

630

*\*Pterostichus (Poecilus) punctulatus* Schall.

## Distribution

*Sweden:* Found only in the extreme south and very rare, and in recent decades even scarcer. Skå, several localities, north as far as: Hälsingborg, Råus-marker, April 22, 1943, 1 specimen (PLQ); Kävlinge (THS 1857, p. 30; 2 specimens, MB! 1 specimen, "coll. ZTT", ML!); Lund Kungsmarken (Roth, HM!); Ilstorp (Roth, MG! MLG 1863, p. 21); Degeberga (THS, coll. RGS!), 1851 (BOH 1851, p. 61); "Northeastern Skå" (WLG, 1866, p. 6). Hll Vapnö, on sandy ground, repeatedly found, more recently in 1919 (FGQ, E.T. 1922, p. 192!). Old (several old collectors!). Högsrum, June 16, 1924, 1 specimen (BRD!). Gtl (several old collectors! Also according to THS 1857, p. 30; 1867a, p. 37. Not found again in the present century).

Erroneous: Vst (GLL 1896, p. 16; 1 specimen, "Vst," JHN, LV! Certainly wrongly labeled.

Absent in the rest of Fennoscandia.

*Adjacent regions:* In Denmark rare but rather widely distributed, both in Jylland as well as on the islands, including Bornholm (West 1940, p. 38). Estonia, two localities in the southeast (HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876; BSK 1922). Not found on the British Isles.

*Total area:* Palearctic species. In Europe predominantly eastern (for instance, absent in western France), south as far as northern Spain (FUE 1920, p. 164), northern Italy (LUI 1929, p. 113), Hungary (KTY 1900, p. 32). Kirgizia and western Turkestan (HEY 1880–1881, p. 30). Western Siberia (HEY l.c.; SBJ 1880, p. 23; RM!).

## Ecology

A xerophilous species, which, according to scant data, has been found in our region always on open, sun-exposed sandy soil, and once in a gravel pit (Skå Hälsingborg). Also in Central Europe quite predominantly on sandy soil (LTZ 1847–1852, p. 190; NBG 1929, p. 123; 1933, p. 52), also on gravel (West 1940, p. 38), in Mecklenburg even on "cohesive" soil (GRD 1937, p. 44); also on cultivated terrain, i.e., fields and fallow land (Dahl 1928, p. 110; NBG 1933). Always in dry, sun-exposed places; the insect is obviously heliophilous (LTZ l.c.).

Distribution of the very few dated Swedish specimens: IV: 1; V: 12; VI: 2; VII: 3. In Denmark, with quite rich material, the spring character of this species is still more pronounced (LRS 1939, p. 332). In Germany occurs predominantly in spring and autumn (LTZ 1847–1852, p. 190; RTT 1908, p. 145). It might therefore be correct to consider the species, as does LRS (l.c., p. 399), a spring breeder that hibernates exclusively as an adult. The beetle's diet purportedly consists of insects (beetles) and snails (BUR 1939, p. 138).

#### Dynamics

Wings fully developed and certainly functional. There are no observations on flight, but one specimen was found (Skå Ystad, Palm) under seaweed on the seashore.

#### Fossil Record

Denmark, postglacial (HNR 1933, p. 134).

\**Pterostichus strenuus* Panz.  
(*erythropus* Mrsh., *wasastjerna* J. Sahlb.)

#### Distribution

*Sweden:* In southern and central Sweden occurring everywhere and frequent. The somewhat uneven distribution in the map is primarily due to the fact that LOH's intensive studies of the forest soil fauna in southern Sweden have not yet been completed. North of about latitude 61° N rarer, very local, but apparently continuously distributed as far as southern Vbt. Between Vbt Umeå and Nbt Luleå a gap occurs and the northern area might be connected only with the Finnish. Northernmost or highest localities are: Dlr Särna (AND, LF); Hamra (SJB); Hls Los (SJB); Färila, 1941, 5 specimens (LBL, RM!); Jtl Ragunda (FRI, 2 specimens, VA!); Ång Mellansel, 1930, 1 specimen (LTH and Palm 1934, p. 39!); Vbt Holmsund, 1936, fragment (LTH). Nbt Neder-Luleå, 1915, 1 specimen (SVN, LL!); Södra-Sunderbyn, 1939, 1 specimen (LTH); Kengis, July 13, 1938, 2 specimens (JNS!); Lul Pållem, June 1941, 1 specimen (WRN).

632 Doubtful: Lyl Lycksele (ZTT 1840, p. 41; no voucher specimen). Tol (FRG, according to ZTT l.c.; "Lapp. bor.," FRG, RM! ML!).<sup>35</sup>

<sup>35</sup>FRG during his Lapland trip in 1832 also visited the coastal region of northern Norway; presumably animals collected in Norway were also labeled "Lapponia" (or "Lapp. bor.").



*Norway*: Distributed continuously along the coast from the Swedish border as far as latitude 69°20'; the gap north of Trondheim Fjord falls in a poorly explored region. Inland localities occur mainly in the southeast, north as far as 14 Fagernes; 11 Tynset, 1924 (SJB!). Also near 30 Hatfjelldal (STE, MO!). Northernmost localities: 36 Målsnes and Mestervik in Malangen (SPS 1910a, p. 78).

Doubtful: Dovre (SNR 1862, p. 328; SHY 1879, p. 17; no voucher specimen).

*Finland*: South of latitude 64° N universally distributed, north of 66° N not found to date. Northernmost near: Ob Pudasjärvi (NSL); Ks Kuusamo (MKL, MH!).

*Russian sector*: In northern Karelia one (or two) locality: Kk Koutajärvi (SBJ 1873, p. 99); Soukelo (SBJ, MH! Probably the same locality?). In the south numerous localities, north as far as Kn Semsjärvi (CRP!).

*Adjacent regions*: In Denmark everywhere and very frequent (West 1940, p. 40). Estonia (HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 364), also Ireland (JHS and HLB 1902, p. 572). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 18).

*Total area*: Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 175), central Italy (LUI 1929, p. 117), Greece (APF 1904, p. 261). In the northeast as far as Arkhangel'sk (PPP 1907c, p. 309). The Caucasus (SDR and LDR 1878, p. 71). Kirgizia (HEY 1880–1881, p. 34). Siberia (among others, SBJ 1880, p. 31; RM!), east as far as Trans-Baikal (MDL 1931, p. 5) and Amur (HEY l.c.).

### Ecology

Occurs predominantly among leaf litter, moss, and brushwood in moderately dense, moderate to markedly humid deciduous forests with a well-developed layer of humus and usually poor ground vegetation, i.e., the drier parts of *Alnus glutinosa* swamps, in beech forests, deciduous forest meadows, and also shaded  
633 shores, especially of eutrophic lakes and rivers. According to RNK (1938, p. 67) this species is a "heath forest dweller," which is definitely incorrect. In open terrain the species occurs only sparsely, but shade is sometimes provided exclusively by tall herbs (for instance, *Filipendula ulmaria*); not rare under seaweed on the seashores (see HLS 1915, p. 27). Loam seems to be a necessary soil component everywhere. Among species of *Pterostichus* the most frequent successive species is *oblongopunctatus*; it is found less often together with *diligens* since this species is seldom found on loamy soil and in eutrophic regions. In Central Europe *strenuus* is likewise eurytopic in humid, more or less shaded places (GRD 1937, p. 44). The brief characterization from Westphalia (WHF 1881, p. 25) is quite apt: "in shaded places, especially on fat† soil".

†(cf. page 587; suppl. scient. edit.).

## Biology

Southern Swedish catches: II: 1; III: 14; IV: 33; V: 76; VI: 106; VII: 46; VIII: 21; IX: 43; X: 12; XI: 7; XII: 4. In Denmark maximum abundance in April, and numerous larvae observed from the end of June to the end of September (LRS 1939, p. 334). Immature beetles found between July 27 (Ögl) and September 18 (Vgl). Spring breeder, hibernating exclusively as an adult. The larva purportedly feeds on both insects and vegetable food (BUR 1939, p. 139).

## Dynamics

Wing dimorphism evident or, more correctly, polymorphism (as in *minor*), since there are at least three types. The first type, the brachypterous form, has only a narrow, triangular wing rudiment, without a reflexed apical part, which varies in length from one-fourth to one-half the length of an elytron. In the second, intermediate form the wings have a more or less distinct reflected apical part, but are too small to be functional. The third form is fully winged and undoubtedly capable of flight; there are no flight observations, but three beetles have been recorded in sea drift in Finland (Frey 1937, p. 39; "*diligens*"! PME 1944, p. 39).

## Fossil Records

Denmark, postglacial (HNR 1933, p. 138). England, interglacial, doubtful identification (Bell 1922, p. 47).

634

*\*Pterostichus (Lagarus) vernalis* Panz.  
(*crenatus* Dft.)

## Distribution

*Sweden*: In southern and central Sweden distributed widely and certainly without gaps (but not recorded to date in southeastern Skå). Farther north scarcer and found only as far as Mdp; in Nbt an isolated locality occurs. Delimiting localities: Vrm Likenäs, 1933 (Palm and LTH 1937, p. 119!); Dlr Mora (RGS!); Leksand, 1918, 2 specimens (TGR, V.A!); Gst Hamrånge, 1936, 2 specimens (LTH); Hls Färila, June 5, 1941, 1 specimen (LBL, RM!); Mdp Njurunda, grassy soil on the river, July 5, 1936, 2 specimens (LTH). Nbt Råneå, Avan, seashore, June 12, 5 specimens, July 17, 1 specimen, 1938 (LTH).

Erroneous: Lapland (GLL 1896, p. 16).

*Norway*: In the southern coastal region distribution apparently continuous from the Swedish border as far as 20 Surnadal, September 1918 (MST, MO!). Extends rather far into the southeastern inland, north as far as: 12 Gran (MO!); Biri and Gjøvik; Ilseng (MO!); 13 Ringeby; 10 Grinder in Solör (MO!).

*Finland:* In the south widely and continuously distributed (also found on almost all the islands); the small gap on the southern coast might only be apparent. North of latitude 63° N only solitary, widely separated localities: Kb Juuka, 1942, 1 specimen (LBG!); Om Jakobstad (SBJ 1873, p. 98; several collectors!); Haapavesi (HEL, NL!); Ob Kuivaniemi (GBL!).

*Russian sector:* Occurs only in southern Karelia, north as far as Ko Petrosavodsk (PME!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 39). Estonia, including Ösel (SUM 1931; LBÅ 1934; HAB 1936a and in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 364), also Ireland (JHS and HLB 1902, p. 573).

*Total area:* Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 172), southern Italy, Sicily (LUI 1929, p. 115), Bulgaria (APF 1904, p. 257). Northern Africa (BED 1895–1914, p. 186). Azores (JEA 1941–1942, p. 742). The Caucasus (CHD 1846, p. 139; SDR and LDR 1878, p. 70). Kirgizia and western Turkestan (HEY 1880–1881, p. 32). Pamir (LSH, *Rev. Russe Ent.*, 1914, p. 440). Siberia (among others, SBJ 1880, p. 25; RM!), east as far as Lena (PPP 1906b, p. 39).

## Ecology

Predominantly a swamp meadow species, which usually lives close to shores of more or less eutrophic ponds, pools, lakes or slow-flowing waters. At the sea occurs only accidentally. It requires wet soil, rich vegetation, especially of *Carex* species, and preferably a distinct moss cover (very rarely *Sphagnum*) on loamy or loamy-sandy soil. It tolerates the weak shade of trees, occurring for instance, on banks with *Alnus glutinosa*, and is found in forests, at most, at the time of hibernation (under moss and such). Statements to the contrary from Central Europe (RTT 1908, p. 150; BLK 1925, p. 31) have been corrected by other authors (Dahl 1928, p. 124; NBG 1929, p. 123; Rapp 1933, p. 116; GRD 1937, p. 44), who explicitly emphasize that the species is a native of open terrain. In Bohemia found in a peat bog (ROU 1934, p. 77).

## Biology

Southern Swedish catches: II: 1; III: 5; IV: 17; V: 38; VI: 67; VII: 24; VIII: 7; IX: 8; X: 4; XI: 0; XII: 1. In Denmark maximum abundance already in April–May (LRS 1939, p. 332). Immature beetles, August 15 (Sdm), October (Ogl), November 24 (Vgl). Spring breeder, hibernating as an adult (l.c., p. 400).



## Dynamics

Wing dimorphism evident. The wings of course always have a reflexed apical part. But in the brachypterous form this part is so short and the entire wing so small that flight cannot be possible. In the macropterous form, which is certainly capable of flight, the surface of the wings is almost double that of the former. Flight observations absent; however, 13 specimens have been recovered from sea drift in Finland (Frey 1937, p. 437; PME 1944, p. 39).

## Fossil Records

Skå and Denmark, postglacial (HNR 1933, p. 134). France, postglacial (LSN 1925, p. 948). Switzerland, interglacial (Heer, according to HNR l.c.).

*\*Pterostichus vulgaris* L.  
(*leucophthalmus* Rossi, Thoms.)

## Distribution

*Sweden:* South of about latitude 61° N universally distributed and very frequent (in the absence of this species from northern Vrm is certainly only  
636 apparent). Also farther north numerous localities as far as Vbt, but not in the mountains; northern limit sharply defined. Delimiting localities: Dlr Lima, frequent (OLS!); Mora (KHG!); Hls Ljusdal (SJB); Mdp Ånge, 1937 (KLF); Jtl Sundsjö, Tavnäs (ING, coll. LTH); Östersund region, 1923, 1924, 1936 (FHL! Holm! LTH); Ulriksfors, 1936, 2 specimens (LTH); Ång Tåsjö (leg.?, coll. ÅGR!); Mellansel, 1930, 1 specimen (LTH and Palm 1934, p. 39!); Örnköldsvik, 1936, 2 specimens (LTH); Vbt Umeå, 1936, 2 specimens (LTH); Robertsfors, 1936, 2 specimens (LTH); Hällnäs, Bodarna, 1935, 1 specimen (HEQ!).

Erroneous: Lapland (GLL 1896, p. 17; no voucher specimen).

*Norway:* South of latitude 62° N frequent everywhere, both on the coast and in the valleys. Northern limit rather sharply delineated and represented by the following localities: 8 Askvoll and Söndfjord; 9 Söndmör, frequent (Strom, according to SHY 1879, p. 17); 24 Sörem in Vågå (SIE 1875, p. 94); 11 Koppang. Highest localities in addition: 17 Fyresdal; 16 Vestfjorddal; 15 Ål; 23 Grindaheim.

*Finland:* South of about latitude 63° N universally distributed and very frequent; farther north rapidly decreases in number. Northernmost localities: Oa Vasa (HLL, MH!); Om Kauhava 1943 (PHJ); Tb Pihtipudas and Kinnula (SAR); Om Lestijärvi (SAR); Haapavesi (HEL, 1 specimen, NL!); Kb Kontiolahti (KRG). Completely isolated near Lk Pelkosenniemi, 1937, 1 specimen (STN!).

Doubtful: Lapland, latitude 67° N (SBJ 1873, p. 98; "Lapponia," SBF, MH!).

*Russian sector:* Lj Triostrova (KLM, MH! "Orloff," PPP 1905, p. 94). Otherwise only in southern Karelia, north as far as Kn Karhumäki, 1942 (CRP!).

*Adjacent regions:* In Denmark occurring everywhere and very frequent (West 1940, p. 39). Estonia, including Ösel (HAB 1936a and in litt.; Palm!); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 571). Shetland (West 1930, p. 75).

*Total area:* Palearctic species. In Europe south as far as northern Spain (FUE 1920, p. 174), southern Italy (LUI 1929, p. 116), Bulgaria (APF 1904, p. 259). In the northeast as far as Pechora (SBJ 1898, p. 339; PPP 1907c, p. 308). The Caucasus (JAC 1905–1908, p. 342). Siberia (among others, SBJ 1880, p. 26; RM!), east as far as Amur (HEY 1893, p. 20).

### Ecology

A eurytopic species inhabiting open terrain. It requires less humidity than 637 *niger* and tolerates only moderate shade. The two species occur together therefore mainly in open forests, at forest fringes, as well as in meadows with tall vegetation. The species *vulgaris* is most numerous on rather dry, moderately overgrown grassy or meadow soil; as a species strongly favored by culture, it occurs primarily in fields, gardens, and farms, along paths, at port installations, etc., often even in the center of the city. Soil conditions are very minor in importance; it is absent only on pure sand and pure gravel. Higher up in Scandinavia it does not reach the fjelds; the record near Lj Triostrova in the tundra region can certainly be ascribed to displacement by man. In Central Europe likewise highly eurytopic (see Dahl 1928, p. 122; Rapp 1933, p. 118; GRD 1937, p. 44).

### Biology

Southern Swedish catches: III: 5; IV: 34; V: 114; VI: 151; VII: 108; VIII: 80; IX: 20; X: 5. In Denmark maximum abundance in July–August, and numerous larvae found in all months from March to November, most in April–May (LRS 1939, p. 334). Numerous immature beetles collected between June 20 (Sdm) and August 9 (Ble). Undoubtedly an autumn breeder, always hibernating in the larval stage (l.c., p. 402). Yet mature beetles hibernate so regularly that (as in *niger*) further studies are required to ascertain whether they normally live more than a year and breed twice. In Central Europe the beetle purportedly feeds on lepidopteran larvae, and in our region in captivity, among others, on larvae of noctuids (NOT 1943, p. 33). It is also known as a regular pest of

strawberries (Dahl 1928, p. 60), and in England also cereals and rape plants (BLK 1925, p. 31; BUR 1939, p. 140).

### Dynamics

The beetle is normally brachypterous, and the wing rudiment equal to only two-thirds the length of an elytron. However, in our region solitary macropterous beetles also occur (see LTZ 1847–1852, p. 221; SHM 1860, p. 456), which are certainly capable of flight. However, flight observations are absent to date. Macropterous specimens are usually easy to recognize externally by their longer, parallel-sided elytra.

### Fossil Records

Denmark, postglacial (HNR 1933, p. 138). England, postglacial (Bell 1922, p. 47). France, postglacial (LSN 1925, p. 948). Belgium, interglacial (LAP 1902, p. 552; 1903, p. 229). Galicia, glacial (SCL 1916, p. 50).

638

### *\*Sphodrus leucophthalmus* L. (*planus* Fbr.)

#### Distribution

*Sweden:* Only solitary localities, especially in the southwest. In the present century the species has sharply declined in number, and in recent decades been found only near Halmstad. Skå Trälleborg, 1861–1868, numerous (MLF, according to THS 1867a, p. 47; ML!); Håslöv, 1887–1888 (PTT, RM! MG! VA!); Lund (THS 1859, p. 257; GAD, LJ!); Bara-Änggård (MLC, HM!); “northeastern Skå” (WLG 1866, p. 5); Båstad (THS 1867a, p. 47; MB!). Små Kalmar (AHT, VA!), 1866 (STH, 2 specimens, ML!). Hll Halmstad (FGQ, E.T. 1941, p. 187); Skrea (RGS, E.T. 1913, p. 232!). Vgl Göteborg, 1906 (SDN, MG!); Mölndal, numerous in the 1890’s (ERC, many collections!); Mariestad (leg.?, MG!). Upl (BOH, according to THS 1857, p. 42; leg.?, VA!), Uppsala, August 1905, 1 specimen (WRN). Vst, 1 specimen (certainly Västerås, JHN in litt.).

*Norway:* No records.

*Finland:* Widely separated localities that do not form a continuous area. In the southwest several localities: Ab Åbo (SBJ 1873, p. 116); St Yläne (SBJ l.c.; MH! MÅ!); Ni Frugård Nordenskiöld (MH!); Sibbo, Läparö (SBJ l.c.); Borgå (EDG, MH!); Ta Messukylä (Grahm, FA); Kuhmalahti (Vappula, FA). Next three isolated localities: Sb Kuopio (SBJ l.c.; MH!). Ok Ruhtinassalmi (SSK, MH! MÅ!). Ks Salla (ENW, MH!). Only the records from Ta and Ok might be from the twentieth century.

*Russian sector:* No records.

*Adjacent regions:* In Denmark rare, but found both in eastern Jylland and



on the islands, but not on Bornholm (West 1940, p. 42). Estonia, including Ösel (HAB in litt.). Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 365), also Ireland (JHS and HLB 1902, p. 577).

*Total area:* Western Palearctic species. In Europe south as far as southern Spain (FUE 1920, p. 186), Corsica (DEV 1935, p. 54), southern Italy, Sardinia, Sicily (LUI 1929, p. 129), Greece, and Crete (OTZ 1886, p. 211). East as far as Volga (JAC 1905–1908, p. 320). Northern Africa (BED 1895–1914, p. 195). Canary Islands (JEA 1941–1942, p. 852). Asia Minor (BOD 1927a, p. 23). Iran (BOD 1927c, p. 24). The Caucasus (SDR and LDR 1878, p. 68).

639

### Ecology

Exclusively synanthropic, occurring in cellars, outbuildings, bakeries, grinding mills. Repeatedly found together with *Pristonychus*, once (Hll Skrea) with *Blaps lethifera* Mrsh. The record from outdoors in Finland (SBJ 1873, p. 116) was certainly accidental. In the rest of Europe likewise, almost without exception, found indoors (F.F. 1910, p. 40; West 1940, p. 42; S.E.Z. 1915, p. 213; Rapp 1933, p. 124; JEA 1941–1942, p. 852; FWL 1887, p. 85). In Denmark found together with *Blaps* and blattids (LRS 1939, p. 390). In rare cases (and possibly accidentally) found outdoors (JNN 1905, p. 190); singly in grottoes (BUR 1939, p. 151; JEA l.c.). As for the assumption that this species is dependent on mouse nests (HSN and LRS 1941, p. 122), see remarks under *Pristonychus* above.

### Biology

The very few dated Swedish catches are from June to October. In Denmark, rich in material, most of the specimens were collected in August–September; according to LRS (1939, pp. 328, 390) it is therefore an autumn breeder, hibernating in the larval stage. However, compare *Pristonychus*.

### Dynamics

Wings fully developed (also in Swedish specimens), but according to LTZ (1847–1852, p. 155) “sometimes reduced”. Spontaneous flight to light observed in northern Italy (MÜL 1926, p. 232).

*\*Stenolophus mixtus* Hbst.  
(*vespertinus* Panz.)

### Distribution

*Sweden:* Only five localities in Skå: Skabersjö, Duveholm, May 1890, April 1894, September 1896 (PTT, MG! coll. GLL, SA! THS 1869–1895, p. 1601); Sandhammaren, Tyke-å, May 14, 1943, 1 specimen (NYH); Nybro, June 24,

1931, 1 specimen, on the seashore (Palm, coll. LTH); Örtofta, May, June 1941, numerous (NYH, ML! coll. LTH); Hässleholm, Stattenamossen, May 24, 1942, 1 specimen, April 23, 1943, 5 specimens (PLQ!).

Erroneous: "Vgl" (VNS, 1 specimen, RM! Undoubtedly wrongly labeled; see *Bembidion litorale*).

Norway: Absent.

- 640 *Finland* (map in PME and PFF 1943, p. 188): On the Isthmus of Karelia (IK) recently discovered in three localities: Terijoki (HLL 1929, p. 95; N.E. 1928, p. 54! PRT); Uusikirkko (PRT, PFF); Metsäpirtti (PRT). Also on Tytärsaari in the Gulf of Finland, 1 specimen (HLL!).

*Russian sector*: Just north of the mouth of the Swir, 1942, several specimens (PFF! KRH, N.E. 1943, p. 163! PME, S.H.A. 1943, p. 35).

*Adjacent regions*: In Denmark rather rare but widely distributed (also Bornholm) and even found (accidentally?) near Tranum beach in northern Jylland (West 1940, p. 29). Estonia, only near Dorpat, 1933 (HAB 1935a), Embach shore, 1936 (KLF!). Not found in Latvia; on the other hand in Leningrad region (OBT 1876). British Isles (Joy 1932, p. 355), also Ireland (JHS and HLB 1902, p. 566).

*Total area*: Palearctic species. In Europe south as far as Portugal (FUE 1919, p. 135), Corsica (DEV 1935, p. 43), central Italy, Sardinia, Sicily (LUI 1929, p. 93), Greece (OTZ 1886, p. 209). Northern Africa (BED 1895–1914, p. 155). Iran (BOD 1927c, p. 31). The Caucasus (CHD 1846, p. 186; LSH 1936, p. 141). Kirgizia (HEY 1880–1881, p. 47). Western Siberia (HEY l.c.; SBJ 1880, p. 45; RM!).

### Ecology

The only large catch in Sweden (Skå Örtofta) was made on the shores of loamy pools, drying up in summer, under decaying plant residue. Near Skå Hässleholm occurs on peat with a loamy mud cover, just next to water together with *Acupalpus flavicollis*. In Finland likewise at a pool and found together with *Acupalpus flavicollis* (HLL 1929, p. 95); in Russian Karelia large numbers at Ladoga, "along a flat, highly humus, bottomland-meadow-type shore" (PME and PFF 1943, p. 143). Also in Denmark and the rest of Europe always at very humid places with rich vegetation, quite predominantly on banks, usually of stagnant, often very small bodies of water (MÖL 1862, p. 93; GRD 1937, p. 48; DTZ 1939, p. 56), preferably under species of *Carex* (Dahl 1928, p. 164). Less often in humid meadows or at edges of bogs (GRD l.c.; West 1940, p. 29).

### Biology

Distribution of the few Swedish specimens: IV: 6; V: 8; VI: 6; VII–VIII: 0; IX: 1. Also in Denmark a pronounced early summer species, which is poorly represented in autumn; immature beetles occur in September. Spring breeder,

- 641 hibernating as an adult (LRS 1939, pp. 343, 420). In Germany one specimen observed on an umbel, probably a pollen eater (GRD 1937, p. 28).

### Dynamics

Wings fully developed and often used. Flight observed in Finland (PRT, according to KNG) and repeatedly in the more southern regions, (HST, E.N. 1876, p. 79; E.B. 1930, p. 153; LHS 1936, p. 141). In northern Germany the species seems to have increased in numbers in recent years (GRD 1937, p. 79).

*Stenolophus skrimshirani* Steph. (*melanocephalus* Dej.): Occurs on the Danish islands (including Bornholm), but to date not definitely recorded from Fennoscandia. However, in RM (!) there is one specimen of this species under the name "*vaporariorum*," with this label: "Sc. Skanörs ljung?", MLF. An occurrence in Skå is of course possible.

\**Stenolophus teutonius* Schrk.  
(*vaporariorum* Fbr., *anglicus* Schiø.)

### Distribution

*Sweden*: Only one specimen known: Skå Trälleborg, August 1862 (MLF, MG! THS 1867a, p. 65).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark found only in the south (southern Jylland, Lolland, Falster, southern Sjaælland, Bornholm) and rare (West 1940, pp. 28–29). Absent in Estonia and the Leningrad region, as far as I know. On the other hand, according to ULN (1884, p. 14), occurs in eastern Latvia. British Isles, only England (Joy 1932, p. 356).

*Total area*: Euro-Mediterranean species. In Europe south as far as southern Spain (FUE 1919, p. 134), Corsica (DEV 1935, p. 42), southern Italy, Sardinia, Sicily, Malta (LUI 1929, p. 92), Greece (OTZ, 1886, p. 209). According to JAC (1905–1908, p. 385) east as far as Ural, Sverdlovsk. Northern Africa (BED 1895–1914, p. 154). Canary Islands, Madeira, Azores (JEA 1941–1942, p. 697). Records from the Caucasus and Trans-Caspian region (still in CKI 1927–1933, p. 1266), as well as from Iran and western Turkestan, are doubtful; these records might pertain to *persicus* Mannh. and *abdominalis* Gené. The record of "Siberia" in JEA (l.c.) probably refers to the record from Sverdlovsk.

### Ecology

In Denmark collected in large numbers, especially in a loam pit. In the rest of Europe, of course, found in humid places but not restricted to shores; on



the other hand predominantly in humid meadows and bogs (ROU 1934, p. 79; GRD 1937, p. 48), also in forests (CLS 1851, p. 116); numerous once in a garden (DTZ 1939, p. 54). On shores together with *Omophron* and *Agonum marginatum* (DTZ l.c.).

### Biology

In Denmark predominantly in June, and larvae and pupae in August (LRS 1939, p. 343); in Germany immature beetles found in August and September (DTZ 1939, p. 54). Hence undoubtedly a spring breeder, hibernating as an adult (LRS l.c., p. 419).

### Dynamics

The insect is fully winged and certainly capable of flight. To the best of my knowledge however, no flight observations available.

### \**Stomis pumicatus* Panz.

#### Distribution

*Sweden*: Continuously distributed only in the southeast (Skå, Ble, eastern Små, Öld, Gtl). Delimiting localities here: Skå Hallands-Väderö, 1937 (RNA, O.E. 1939, p. 176); Finjasjön, 1938 (HZE); Ignaberga, 1939, 2 specimens (KMN, ML!); Näsum, Sibbarp, 1935 (LOH!); Små Vissefjärda, 1926 (LOH!); Döderhult, Fagereke, 1932 (LOH, according to JNS); Ankarsrum (LOH, according to JNS). Öld Borgholm, 1928 (LOH, according to JNS). Gtl Irevik, 1934 (LOH!). Otherwise only more or less solitary localities. Små Åker (BRK); Lyckås, 1923 (CDG). Hll Släp, Budskär, 1921, 1 specimen (SDN, MG!). Vgl Göteborg region, several localities (several collectors!); Kinnekulle (HCK, E.T. 1910, p. 240; VM). Ögl Omberg, Ålebäcken, 1930, 1 specimen (Palm); Skänninge, Älgsjöarna, 1927, 2 specimens (Palm); Västra-Ny, 1852 (HGH 1853, p. 16); Norrköping, Bjärby, 1924, 1925 (WSJ!). Stockholm Exp:fältet, 1932, 1 specimen (LTH). Upl Runmarö (HFS, 6 specimens, LÖ!). Dlr (probably Hedemora; RGS, E.T. 1913, p. 232!); Falun, on a road, June 16, 1937, 1 specimen (KLF, ML.).

*Norway*: Absent.

*Finland*: Only two localities on the Isthmus of Karelia (Ik); Uusikirkko, Vammeljoki, first discovered in 1937 (PME, S.H.A. 1937, p. 171), found again  
643 in two successive years (PRT, SUH); Kuokkala, June 7, 1938 (HLM, coll. STK).

*Russian sector*: No records.

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and not rare (West 1940, p. 38). Estonia, four localities, also on the northern

coast and on Ösel (HAB 1936a, and in litt.). Latvia (SDL 1872; ULN 1884). Leningrad region (BSK 1929, p. 144). British Isles (Joy 1932, p. 362), also Ireland (JHS and HLB 1902, p. 570).

*Total area:* Western Palearctic species. In Europe south as far as Portugal (FUE 1920, p. 161), southern Italy, Sicily (LUI 1929, p. 112), European part of Turkey (APF 1904, p. 213). East as far as Ural (JAC 1905–1908, p. 335). Asia Minor (according to CKI 1927–1933, p. 501). The Caucasus (CHD 1846, p. 150; SDR and LDR 1878, p. 70).

### Ecology

On loamy soil, often with a considerable admixture of humus, partly in open situations, i.e., at edges of fields with a more or less rich vegetation of herbs, partly in shrub-rich meadows of leaves and open deciduous forest stands. Soil moisture moderate to fairly low (sometimes the vegetation is uneven of the dry meadow type). In our region the species is largely more or less synanthropic, for instance in parks, gardens, and even compost heaps. From Central Europe I could find only one record of a synanthropic occurrence, from Carinthia: "I observed this species only in house gardens" (SZM 1907, p. 128). Otherwise it always occurs independent of man (also in Denmark). Another difference is that this species generally occurs in humid places, i.e., shores of various kinds (Dahl 1928, p. 104; Rapp 1933, p. 109). In Denmark it has been found many times in mole and mouse nests (RSB, E.M. 1913, p. 42; West 1940, p. 38), in the rest of Europe in hamster burrows (BUR 1939, p. 130). It is indeed possible that actual dependence is involved here. Unfortunately the larva is neither known taxonomically nor biologically.

### Biology

Distribution of dated Swedish specimens: IV: 10; V: 20; VI: 41; VII: 17; VIII: 6; IX: 1. In Denmark, richer in material, maximum abundance in May (LRS 1939, p. 331). Undoubtedly a spring breeder, hibernating as an adult (l.c., p. 398).

### Dynamics

Wings reduced (LTZ 1847–1852, p. 185) and, in the Swedish specimens examined by me, consist of a small, pointed, triangular scale, less than one-fifth the length of an elytron. The carabid might always be flightless and the record "frequent in gas tanks" from Elberfeld (CRN 1884, p. 11; see p. 15 above) is thus very strange (but see *Calathus fuscipes* and *Dyschirius globosus*).

\**Synuchus nivalis* Panz.  
(*vivalis* Ill.)

Distribution

*Sweden:* In southern and central Sweden widely distributed and probably without gaps but rather unevenly (more frequent in the west). In the Bothnian coastal region rare and very local, but nonetheless continuously distributed as far as the Finnish border. Delimiting localities: Vrm Sunne, 1942 (LDN); Dlr Floda, 1930 (LTH); Hls Los (SJB); Jtl Ragunda (FRI, 3 specimens, VA!); Undersåker, 1914 (RNG, coll. BRD!); Åre (AND, 2 specimens, LF!); Åsl Dorotea, July 23, 1936, 2 specimens (LTH); Vbt Vindeln, 1930, 1 specimen (LTH and Palm 1934, p. 37!); Sikeå, 6 specimens, Bureå, 1 specimen, 1936 (LTH); Nbt Piteå, 1936, numerous (LTH); Över-Kalix, Nedre-Rödupp, 1938 (LTH); Kengis, July 13, 1938 (JNS).

*Norway:* On the coast and in the southern valleys widely but rather unevenly distributed, yet certainly continuous and extends into the Trondheim region. Northernmost localities: 13 Sel and 11 Sollia (HSS); 20 Ormem and Flatmark in Romsdal (SIE 1875, p. 102); 9 Ålesund (SIE l.c.); 26 Stadsbygden (STM 1877, p. 153); Vallersund (N.E.T. 1923, p. 276); 27 Trondheim and 28 Steinkjer (N.E.T. 1937, p. 147).

*Finland:* In the south as well as the central inland parts widely distributed, probably without gaps. On the western coast only north as far as St Rauma (SDM, MH!). On Åland only one definite locality: Finström (STN!). Also found at Tytärsaari in the Gulf of Finland (THG! HLL). Delimiting localities toward the northwest: Tb Virrat (KNG); Viitasaari (LBG); Ok Sotkamo (PHJ); Suomussalmi (SSK, MH! MÅ!). Removed from these, but connected with the Swedish area: Ob Kemi (SAA!).

*Russian sector:* Found only in southern Karelia but numerous localities, north extending into Saoneskje region (PPP 1899a, p. 17; MH!).

645 *Adjacent regions:* In Denmark widely distributed (including Bornholm) but not frequent (West 1940, p. 42). Estonia (HAB in litt.); Latvia (SDL 1872; ULN 1884). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 369), also Ireland (JHS and HLB 1902, p. 577).

*Total area:* Palearctic species. In Europe distributed south as far as Portugal (FUE 1920, p. 196), Corsica (DEV 1935, p. 55), central Italy, Sicily (LUI 1929, p. 131), Montenegro (APF 1904, p. 287), Transylvania (PTI 1912, p. 37). Asia Minor (ECH 1922, p. 35). The Caucasus (CHD 1846, p. 129; SDR and LDR 1878, p. 69). Western Turkestan (HEY 1880–1881, p. 27). Siberia (HEY l.c.; PPP 1907d, p. 23), east as far as Amur (HEY 1893, p. 17).

Ecology

Occurs on open, somewhat markedly dry, sandy or gravelly soil (also with some



admixture of loam or humus), with sparse vegetation of the grasses and herbs, sometimes of *Calluna* (S.H.A. 1939, p. 54). Not rare in fallow and cultivated soil. The species also tolerates some shade and is therefore also found among leaf litter and moss at forest fringes or in open deciduous forests with poor ground vegetation. Also in gravel pits. From the rest of Europe it has likewise been recorded from humid places (FWL 1887, p. 84; GRD 1937, p. 42); on the other hand, according to Dahl (1928, p. 92), occurs in Germany in dry, unshaded places.

### Biology

Southern Swedish catches: V: 2; VI: 31; VII: 61; VIII: 47; IX: 10. Also in Denmark maximum abundance in July (LRS 1939, p. 328). Numerous immature beetles found between June 19 (Skå) and July 11 (Sdm), July 12 (Vbt). It is thus a spring breeder, hibernating exclusively in the larval stage (l.c., p. 391). The record of larvae in acorns, which were attacked by larvae of *Balaninus* (XAM, according to BLK 1925, p. 34), must have been an accidental occurrence.

### Dynamics

Wing dimorphism evident. Wings indeed always with a reflexed apical part, and hence it is quite difficult to draw a line between the two forms. In certain  
 646 individuals the wings are nonetheless so poorly developed, namely the apical part is so short, that they cannot be functional. Fully winged specimens are probably capable of flight but to date no observations to this effect available. In Elberfeld "sometimes frequent in gas tanks" (CRN 1884, p. 12; see p. 15 above).

### Fossil Record?

England, late glacial, identified with some reservations (BLR 1924, p. 559).

### \**Tachys bistratus* Dft.

#### Distribution

*Finland:* Occurs only in three localities in the southeast: K1 Salmis, partly at Uuksunjoki, June 1938, very numerous in wood cuttings on the river (N.E. 1938, p. 131; S.H.A. 1939, p. 219; PME and PFF 1943, p. 141!), 1 specimen on the bank of Tulemajoki, 1942 (ELF, N.E. 1943, p. 177). Kb Kitee 1939, 3 specimens, in the biotope completely identical to that near Uuksunjoki (PME!).

*Russian sector:* Sv Gumbaritsa, 1 specimen, under the bark of a dead, fallen stem of *Populus tremula*, 1942 (PME and PFF, l.c.).

*Scandinavia*: Absent.

*Adjacent regions*: In Denmark found on Årø Island under seaweed on the seashore, several specimens (E.M. 1933, p. 362; West 1940, p. 18); later discovered at Langeland (HSN and LRS 1941, p. 380). Absent in Estonia; on the other hand found in Latvia near Riga (Muethel 1889, p. 6; SDL 1891, p. 761). Not known in the Leningrad region as far as I know. British Isles (Joy 1932, p. 334).

*Total area*: Western Palearctic species. In Europe predominantly southern (very rare in northern Germany; HOR 1941, p. 167), south as far as Portugal, southern Spain, and the Balearic Islands (FUE 1919, p. 79), Corsica (DEV 1935, p. 28), southern Italy, Sardinia, Sicily, Malta, Pantellaria (LUI 1929, p. 68), Greece, and Crete (OTZ 1886, p. 206). East as far as Ural (JAC 1905–1908, p. 292). Northern Africa (BED 1895–1914, p. 78). Canary Islands and Madeira (JEA 1941–1942, p. 428). Asia Minor (among others, APF 1904, p. 117). The Caucasus (CHD 1846, p. 193; SDR and LDR 1878, p. 84). Turkmenia (HEY 1896, p. 10).

647

### Ecology

In Central Europe almost exclusively a riparian species, living especially along flowing water (large as well as small bodies) and preferring loamy soil (LTZ 1885–1892, p. 16; HOR 1937, p. 27; 1941, p. 167). It has been found additionally at stagnant waters (E.N. 1888, p. 24; Rapp 1933, p. 54) and in Denmark and England at the sea (LRS 1939, p. 374; FWL 1887, p. 99). Nevertheless its occurrence in eastern Fennoscandia is very strange, since this carabid has been considered by PME primarily a forest species (comparable with *Tachyta*). In this regard it is interesting to note that it has also been purportedly found in Austria on tree trunks (DLT 1879, p. 38). On the other hand, it is noteworthy that, like *T. bistriatus*, *Perileptus* (3 specimens) was also found in its single eastern Fennoscandian locality exclusively in wood cuttings, suggesting without doubt a characteristic, true, and primary inhabitant of river banks. In each case the northernmost subarea of the pertinent species is involved and hence it is quite likely that we have a microclimatic adaptation to an unfavorable climate (also pointed out by PME and PFF 1943).

### Biology

LRS (1939, p. 373) assumes that in Denmark this species breeds in spring. In Central Europe both larvae and adults hibernate (BUR 1939, p. 92).

### Dynamics

Normally wings fully developed (also in Finnish specimens); a brachypterous

form exists only in the Pyrenees (JEA 1941–1942, p. 428). Spontaneous flight to light was observed in Hungary (HST, E.N. 1876, p. 79).

*\*Tachys (Porotachys) bisulcatus* Nic.

Distribution

Sweden: Only four widely separated localities. Vgl Dagsnäs, at a sawmill swept in the evening, June 1939, 1 specimen (JNS). Gst Grönsinka, 1935–1937, numerous by the side of a water sawmill (Palm, E.T. 1938, p. 113! Also see below). Hls Los, August 3, 1931, 1 flying beetle (SJB). Lyl Sorsele, July 1928, 1 specimen (GTZ, E.T. 1932, p. 49; coll. LTH).

Norway: No records to date.

Finland: Rare, but in the southwestern inland rather widely distributed. Delimiting localities here: Ab Lojo region, four localities (several collectors!); St Karkku (HLL, MH!); Tb Jyväskylä (SBJ, MÅ! HBG, MH! STK; STN); Saarijärvi, Pyhähäkki, 1943, 1 specimen (STN); Nl Frugård (SBJ 1873, p. 89; "Nylandia," MKL, MH!); Helsing (HLL; PFF). Three localities isolated in the southeast: Ik Terijoki (WLL); Uusikirkko (PRT). Kl Salmis, 1938, 3 specimens (PFF, N.E. 1938, p. 131).

Russian sector: No records to date.

Adjacent regions: Absent in Denmark and also not known in the Baltic States. On the other hand, found in Leningrad region (OBT 1876). British Isles, one locality (Joy 1932, p. 334), perhaps introduced.

Total area: Western Palearctic species. In Central Europe predominantly southern, missing for instance in the German Baltic Sea region (HOR 1941, p. 170). East as far as European Turkey (APF 1904, p. 20), farther north only as far as Slovakia (ROU 1930, p. 129) and in Russia, for instance, not known outside the Leningrad region (JAC 1905–1908). South as far as Portugal and central Spain (FUE 1919, p. 81), Corsica (DEV 1935, p. 29), central Italy, Sardinia, Sicily (LUI 1929, p. 69), Greece (OTZ 1886, p. 206). Northern Africa (BED 1895–1914, p. 74). Madeira (JEA 1941–1942, p. 434). Asia Minor (APF l.c.). The Caucasus (according to JEA l.c.).

Ecology

An exact description of the mode of life of this species near Gst Grönsinka has been given by Palm (E.T. 1938, p. 113). It lives at a sawmill in piles of decaying, wet pieces of spruce bark at a depth of 2 to 3 dm. In Finland it has been found under planks next to piles of sawdust (SBJ, E.T. 1916, p. 57), and likewise in a pile of spruce bark (Tb Jyväskylä, 2 specimens, STN in litt.); finally, one specimen was found under the bark of a dead, fallen giant spruce in a virgin forest (Tb Saarijärvi, STN in litt.). The last mentioned occurrence is certainly primary, as assumed by Palm (l.c.). In Central Europe observed singly



on banks, which HOR (1941, p. 171) considers accidental occurrences; also "in mouldy humus at the base of pollard willows" (Wolf 1940, p. 169; see RTT 1908, p. 125); finally, on the bank of the Drava "in large heaps of small pieces of wood washed ashore" (W.E.Z. 1900, p. 239). Thus the occurrence of this species in Central Europe is very similar to that in Sweden. In southern Europe  
 649 found in grottoes (BUR 1939, p. 92; JEA 1941–1942, p. 433); distinctly shy of light, also in our region. The thermophilous nature of the species assumed by HOR (see 1937, p. 28) has to be rejected.

### Biology

According to Palm (E.T. 1938, p. 114) the species is most frequent in spring, with a few immature beetles found in late autumn. Hibernation thus occurs apparently in the adult stage.

### Dynamics

Wings fully developed and flight observations are numerous: Gst (Palm l.c.); Hls (SJB); Ik Terijoki (PRT; according to KNG); also from Germany (HRT 1924, p. 277; HOR 1941, p. 171); France (GAV 1897, p. 177; JEA 1941–1942, p. 433); Italy (MÜL 1926, p. 98).

### \**Tachyta nana* Gyll.

#### Distribution

*Sweden:* In the eastern half of the country from the Finnish border as far as northern Skå probably continuous in distribution but very local, and only in Norrland sometimes numerous. Not found on Öld and Gtl. Delimiting localities westward: Skå, Glimakra (THS, 2 specimens, ML! Specimens from Skå without locality in MB! coll. RGS!); Små Virserum (JNS!); Jönköping, Råslätt, 1883 (GAD, 2 specimens, HM!); Ögl Trehörna, 1929, 2 specimens (Palm); Skedevi, Byle (JNS!); Sdm Sparreholm (SDN, MG!); Vst Västerås (SDN, 2 specimens, MG!); Gst Grönsinka numerous (Palm! LTH); Dlr Hamra, 1927 (JNS and SJB 1932, p. 17!); Jtl Revsund and Bodsjö, 1942, numerous (BGW!); Ång Tåsjö, 1939, 3 specimens (BRC, RM!); Lyl Sorsele, Holmfors, 1937 (FRL!); Lul Jockmock, 1924, numerous (LTH); Nbt Pajala, Juhonpien (ZTT 1828, p. 11). In western Vrm two isolated localities, apparently connected with the Norwegian area: Lekvattnet, 1928 (Palm); Östmark, 1911 (SAA!).

*Norway:* In the southeastern inland a fairly wide, continuous area, west as far as 4 Nes-Verk (MST, MO!); 17 Fyresdal (MST, MO!); 16 Sande; 15 Teksle in Lyngdal (MO!); north as far as 15 Noresund in Krödsherad (HLS 1891a, p. 11); 10 Åmot. Only near 1 Halden on the coast. In the high north one isolated locality: 36 Rundhaug in Målselv, 1938 (STA in litt.).

650 *Finland*: In the inland of the southern half distributed apparently without gaps, becoming scarcer toward the north, but also found in Lapland. The coast is chiefly reached in the southwest; on the entire western coast found only near Om Pedersöre (SAR) and Ob Kemi (EHN, MÅ!). The species seems to be absent on Åland and all the other islands. Northernmost localities: Ob Rovaniemi (several collectors!); Ks Vuorijärvi, 1936 (STN); Vuorikylä (STK); Lk Pallastunturi (SAA 1917, p. 282; MH!); Lp Lutto, Köngäs, 1939, 5 specimens (PFF, N.E. 1942, p. 66).

*Russian sector*: In southern Karelia numerous localities and very frequent (several collectors! PPP 1899a, p. 11; SAA 1917, p. 282), north as far as Kn Karhumäki, 1942 (CRP!).

*Adjacent regions*: Not found in Denmark. Estonia (SDL 1872; HAB in litt.); Latvia (SDL 1872; ULN 1884; LCK and MIK 1939). Leningrad region (OBT 1876). Not found on the British Isles.

*Total area*: Palearctic species (its occurrence in North America is doubtful according to JEA 1941–1942, p. 441, and earlier according to Leng 1920, p. 54). In Central Europe decidedly montane ("boreo-montane"; HOR 1941, p. 171), south as far as Portugal (FUE 1919, p. 82), Corsica (DEV 1935, p. 29), southern Italy, Sardinia (LUI 1929, p. 70), Greece (OTZ 1886, p. 206). Northern Africa (BED 1895–1914, p. 77). Asia Minor (BOD 1927b, p. 26). Iran (BOD 1927c, p. 16). The Caucasus (CHD 1846, p. 195; SDR and LDR 1878, p. 84). Siberia (among others, SBJ 1880, p. 20; RM!), east as far as Amur (HEY 1880–1881, p. 48; BOD 1927b, p. 26) and Lena (PPP 1906b, p. 34).

### Ecology

This species lives exclusively under loose bark on tree stumps or dead, usually fallen limbs in rather sun-exposed but not too dry situations. In our region (including Finland; SAA 1917, p. 281) it distinctly prefers pine (*Pinus silvestris*), and birch comes second. Repeatedly found on spruce as well, singly on *Quercus robur*, *Alnus incana*, and *Populus tremula*. In Central Europe the species has also been repeatedly found on *Fagus* (KTT 1873–1874, p. 136; HEB and MEX 1933, p. 75; HOR 1941, p. 171), in Russia on *Fraxinus* (SAA l.c.). The carabid occurs only where tunnels of Ipidae exist. In our region it has been found twice together with *Scolytus scolytus* Fbr. (*ratzeburgi* Th.) on birches (Vrm, Palm; SAA l.c.). In France and Russia found in tunnels of many species of Ipidae (SAA l.c.). Predominantly a species of high boreal coniferous forest region, and very rare in southern Sweden. On the other hand it has been found in *reg. bet.* only in northern Norway (36 Målselv).

### Biology

Distribution of Swedish and Finnish (SAA 1917) catches: V: 9; VI: 23; VII: 14;

VIII: 10; IX: 1; X: 0; XI: 1. An immature beetle was found on August 14, 1924 (Lul Jockmock). Undoubtedly a spring breeder, hibernating as an adult. Both beetles and larvae purportedly feed on Ipidae and their larvae, reportedly also on their excrements and exuviae, as well as on Collembola (Perris, according to SAA 1917; BUR 1939, p. 93).

### Dynamics

Wings fully developed and certainly functional. Flight observations absent however.

*\*Trachypachys zetterstedti* Gyll.  
(*transversicollis* Motsch., *laticollis* Motsch.)

### Distribution

*Sweden*: A great rarity, and has been recorded only in four widely separated localities, with only one specimen found each time. Jtl Ragunda, Gerilåsågen, July 28, 1907 (FRI, E.T. 1916, p. 30; MG!). Lyl Sorsele, Fjosokken, June 29, 1929 (Ågren, E.T. 1932, p. 46; coll. LTH). Tol Vittangi, June 15, 1821 (ZTT 1840, p. 31); Karesuando (GPE, according to ZTT l.c.), July 1925 (BRC, RM!). The type specimen (RM!) is labeled "Lapp. bor.," SCH.

*Norway*: Only three localities in the north: 32 Storfjord in Salten, May 21, 1897, 1 specimen (SPS 1910a, p. 66). 36 Målselv, Bjerkeng, July 2, 1885, 1 specimen, on the edge of a small lake (SPS 1888–1889, p. 97), also in June 1907, 2 specimens and June 1929, several specimens, all from near a barn (N.E.T. 1932, p. 24); Møen (STA in litt.).

*Finland*: (map in PME and PFF 1943, p. 176): Solitary specimens in widely separated localities. St Yläne, Kolva (SBJ 1873, p. 65; MÅ!). Ta Tammela, Jackis (SBJ l.c.; MH!); Tammerfors, 1874 (Faust, according to SBJ 1886a, p. 176); all these are old records from the middle of the last century. K1 Salmis, June 1938 (PME, N.E. 1938, p. 127; S.H.A. 1940, p. 80!). Ok Ruthinassalmi (SSK, S.H.A. 1937, p. 106; MÅ !), June 18, 1929 (Tervonen, according to LNN). Ks Salla, 1938 (Y. Kangas), Lp Patsjoki, 1 old specimen (SBJ 1886a, p. 176; PPP 1905, p. 87; MH!). According to SBJ (1873, p. 65) also collected by SBF in lapland.

*Russian sector*: Three records in 1942 and 1943 at the Swir River, Karelka, September 16, 1942 (PFF, N.E. 1943, p. 162!); Gumbaritsa, 1943, on the sandy shore of a small accumulation of water in a mixed forest (PFF); Potporoze, Pitkäjärvi 1942 (J. Kangas!).

*Adjacent regions*: Absent in Denmark. In Estonia near Narva, 1884 (SDL 1891, p. 15). Leningrad region (OBT 1876).

*Total area*: Palearctic species. In Europe, outside the region, found only in Russia, south as far as Yasroslav (SEM 1898, p. 73) and Perm (JAC 1905–1908,



p. 265). Siberia, east as far as Amur (HEY 1880–1881, p. 3; JAC l.c.) and Lena (PPP 1906b, p. 23). Korea (SEM l.c.).

### Ecology

The mode of life of this great rarity is still unknown. Almost all records give the impression of sporadic occurrence. However, on three occasions it was associated with coniferous trees: Jtl Ragunda, on a firewood heap; Tol Vit-tangi, “in Pino recenter secato”; 32 Salten, under bark of a pine stump (SPS 1910a, p. 66); only one specimen in each case. Likewise (in northern Norway and Russian Karelia) found three times on shores. Moderate numbers of this species have been recorded only in 36 Målselv at a meadow barn, both under tufts of grass on its wall and under a limb lying on the ground, an erstwhile support for the barn (N.E.T. 1932, p. 24; STA in litt.). In Siberia on a river bank during flooding (W.E.Z. 1894, p. 219), as well as under moss in the taiga (PPP 1906b, p. 23). The species must at any rate be considered a forest animal; it has never been recorded in the *reg. alp.* or in the tundra.

### Biology

Nothing is known concerning the periods of development or diet.

### Dynamics

Wings fully developed, as observed in one beetle from Norway (36 Målselv), and probably functional.

653

### \**Trechus (Lasiotrechus) discus* Fbr.

#### Distribution

(map in BCH 1938, no. 50)

*Sweden*: Continuously distributed along the west coast, and in a narrow oblique belt across central Sweden. Very local and generally found only singly. Delimiting localities: Skå Hammenhög, 1868 (POR, LJ!); Ringsjö region, repeatedly found, numerous (several collectors!); Hll Edenberga region, numerous (MRT, MG!); Små Södra-Unnaryd, Basteborg, July 22, 1940 (LTH); Vgl Lerum (ÅGR!); Sparresäter (according to a note in coll. GYL, MU); Nke Örebro region, earlier repeatedly collected and in good numbers on lake Hjälmars (RGS, E.T. 1913, p. 232; JNS, E.T., 1915, p. 203!); Upl Ekerö, 1938, 1 specimen (HZE!); Hacksta, 1922 (ING, coll. LTH); Uppsala (SJB); Östervåla, 1907, 1 specimen (OTT!); Älvkarleby, Båtfors, September 1943, several specimens (Palm, LBL!); Gst Storvik, in a garden, August 23, 1935, 1 specimen

(KLF!). Dsl Mellerud region, 1 specimen (FBG!); Boh Långvallsfors, July 28, 1933 (LFF!).

Doubtful: Små, possibly Kalmar region (AHT, 1 specimen, VA!).

Norway: I. In the southeast four localities: 1 Fredrikstad (ULL 1899, p. 294); Onsøy. 2 Oslo region (SHY 1879, p. 15). 12 Eidsvoll. II. In the Trondheim region two localities: 27 Gulosen, 1 specimen (STM; N.E.T. 1923, p. 276); Melhus, 1 specimen (LYS, N.E.T. 1937, p. 146).

Finland: Occurs only in the south. Distribution highly discontinuous. Ik (four localities, several collectors!). KI Jaakkima (KRV!); Salmis, 1941, numerous (ELF, N.E. 1942, p. 176!). NI Helsing, July 1921, August 1922 (BBG); Tali, August 12, 1942 (STK). Ta Hattula (WEG 1907, p. 32; MH! GBL). Ab Kustö, July 27, 1943, 1 specimen (HLQ). A1 Kökar, August 5, 1941, 1 specimen (LBÅ!); Mariehamn (HLM, according to HLL); Finström, Emkarby, 1943 (LBÅ!).

Russian sector: Found only near Ko Nurmoila, 1942 (PFF!).

Adjacent regions: In Denmark rare but widely distributed, absent only in northern Jylland and on Bornholm (West 1940, p. 19). Doubtful in Estonia (SDL 1891); Latvia (SDL 1872; ULN 1884). Leningrad region (OBD 1876). British Isles (Joy 1932, p. 343), also Ireland (JHS and HLB 1902, p. 589).

Total area: Palearctic species. In Europe south as far as southern France (DEV 1935, p. 31), central Italy (LUI 1929, p. 76), Transylvania (PTI 1912, p. 19). Siberia (according to JEA 1941–1942, p. 341). Manchuria; China; Japan (JEA 1928, p. 99).

## Ecology

On loamy, somewhat moist soil (preferably mixed with sand, peat, or humus) with more or less rich, often tall vegetation consisting of grasses, species of *Carex*, *Scirpus silvaticus*, and similar plants (among others, PME and PFF 1943, p. 142). Usually in the vicinity of lakes, smaller, slow-flowing waters, or at the sea. Sometimes also in gardens and generally not rare in the vicinity of human dwellings. The species may occur in large numbers (often together with *micros*) at high water on shores, which has been observed especially in Central Europe (B.E.Z. 1866, p. 299; WLK 1867, p. 13; E.M.D. 1925, p. 366; JEA 1928, p. 98). Danish entomologists have assumed that this species occurs in association with rodents (West 1940, p. 20), for instance, with *Arvicola* (LRS 1939, p. 385), which is probably correct. Near Upl Älvkarleby, Palm and LBL collected several specimens in tunnels of *Arvicola amphibius*. In the Leipzig region one specimen was caught "in the burrow of a mouse" (DTZ 1938, p. 43). In Denmark also observed once in the burrows of *Lumbricus* (West l.c.).

## Biology

Swedish catches: VI: 1; VII: 6; VIII: 13; IX: 4. In Denmark from where richer

material exists, maximum abundance in August as well (LRS 1939, p. 326). Two immature beetles found on July 1, 1922 (Skå Klinta, LTH). Autumn breeder, hibernating in the larval stage (l.c., p. 385).

### Dynamics

Wings fully developed. Several observations of spontaneous flight: Nke Örebro (JNS); Ik Uusikirkko (PRT); Germany (LTZ 1885–1892, p. 16; DTZ 1938, p. 43); France (JEA 1928, p. 98).

### \**Trechus fulvus* Dej.

(*lapidosus* Daws., *rathkei* Helliesen 1893a, p. 31)

### Distribution

*Norway*: Only four localities in the western part of the country. 6 Jæren. Risavika in Håland, 1 specimen, under seaweed (HLS 1915, p. 20); Kvitsøy, 1 specimen under seaweed (HLS l.c.); Nedstrand in Ryfylke, mouth of the Sandgårdselven, collected three times since 1891, only 1 specimen in each  
655 instance (HLS 1893a, p. 32; 1915). 26 Hitra, mouth of the Laksåen, several specimens (LYS, N.E.T. 1923, p. 276; 1937, p. 145). Since the outer parts of the western country have been poorly explored, it is quite possible that additional records in the future will connect the two separate subareas.

Absent in the rest of Fennoscandia, all of Denmark, and the entire Baltic Sea region.

*Adjacent regions*: Nearest localities on the British Isles (Joy 1932, p. 343); Ireland (JHS and HLB 1902, p. 589). Shetland (West 1930, p. 75). The Faeroes (West 1940, p. 13).

*Total area*: Solely European species. Chiefly western: Spain and Portugal (FUE 1919, p. 89), western France (DEV 1935, p. 30). On the Iberian Peninsula five subspecies have been found in addition to *forma typica* (JEA 1927, pp. 207 ff.).

### Ecology

Within the region exclusively a seashore species, which has also been found under seaweed. The nominal subspecies actually occurs exclusively on the sea, on the British Isles just at the upper highwater mark (FWL 1887, p. 127; JHS and HLB 1902, p. 589).

### Biology

Periods of development not known. LRS (1939, p. 517) includes the species



with reservation among "autumn animals" (hence with larval hibernation). In the Faeroes it was collected in August–September (West 1930, p. 13).

### Dynamics

According to JEA (1927, p. 207), only the subspecies *primigenius* Jea. from Spain is fully winged, while the nominal subspecies occurring in our region is always brachypterous. One of the specimens examined by me from 26 Hitra (LYS) has wings reduced to a scale not visible to the naked eye.

### \**Trechus (Trechoblemus) micros* Hbst.

#### Distribution

656 *Sweden*: Distribution highly split. A continuous area is recognizable only across central Sweden. Skå Trälleborg, 1875 (MLF, MG!); Lund, numerous specimens but collected only in the nineteenth century (several collectors!); Reslöv, 1899 (ROS, ML!); Stehag Vedelsbäck, 1890 (MLC, 2 specimens, HM!). Små (GLL 1896, p. 9; coll. THS, MB!), Kalmar (THS in litt., around 1869); Flisby, 1941 (LBL, RM!). Hll Släp, on a small river, numerous at high water (SDN, ERC, MG! ÅGR!). Vgl Göteborg (ÅGR! NDN); Dagsnäs, 1939 (WRN). Boh Bullaren. Östad, 1933 (LTH). Ögl Tåkern region, 1928–1932, occasionally in large numbers (Palm! LTH). Nke Almby, Markkärret, 1924 (JNS!); Asker (N. Lindgren!). Sdm Toresund (SLL, RM!); Tungelsta, Vedasjön, 1937, 2 specimens (LTH); Nacka, 1929 (OLS!), Stockholm (NBL 1840, p. 204; WBG, RM!), Exp:fältet, 1932 (LTH). Upl Hacksta, around 1922 (ING, coll. LTH).

*Norway*: Distributed almost exactly like *discus*. I. Extreme southeast: 1 halden, 2 specimens (N.E.T. 1933, p. 284); Fredrikstad. 2 Oslo, 1 specimen (HLS 1891a, p. 11); Asker, Brönnöy, September 1933, 12 specimens (STA, N.E.T., l.c.). II. Trondheim region: 27 Melhus (N.E.T. 1937, p. 146); Trondheim (N.E.T. 1923, p. 276; 1937, p. 146).

*Finland*: Occurs only in the coastal region of the south, scattered localities. Ab Villnäs (SBJ 1873, p. 89; MH! Åbo (SBJ l.c.). Nl Tuusula (KNG); Helsing (HLL), Linna (STK); Helsinki (STN!); Munksnäs, July 8, 1941 (LBG!). Ka Viborg, June 10, 1937, 1 specimen (KNG!). Ik Uusikirkko (several collectors); Metsäpirtti (KRG! PME, S.H.A. 1937, p. 172).

*Russian sector*: No records.

*Adjacent regions*: In Denmark rare, in Jylland two localities, on Falster and Sjaelland somewhat more widely distributed; absent on Bornholm (West 1940, p. 19). Estonia, only one old record near Dorpat (SDL 1872; HAB in litt.); Latvia (SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 343), also Ireland (JHS and HLB 1902, p. 589).

*Total area*: Palearctic species. In Europe south as far as southern France (DEV 1935, p. 31), northern Spain (JEA 1928, p. 105), northern Italy (LUI

1929, p. 76). Bosnia (APF 1904, p. 127), Transylvania (PTI 1912, p. 19). The Caucasus (CHD 1846, p. 189), western Siberia (SBJ 1880, p. 47; RM! JEA l.c.).

### Ecology

In its mode of life this species corresponds almost completely with *discus*, with which it often occurs together. It seems to exhibit only a somewhat greater predilection for peat soil (also see S.E.Z. 1915, p. 211) and possibly occurs somewhat less on very loamy soil. Always on shores in the vicinity of fresh water. 657 Like *discus*, during high water frequently found in amazingly large numbers (e.g., Hll Släp, SDN!), which has been repeatedly observed in Central Europe (B.E.Z. 1862, p. 279; 1866, p. 299; WLK 1867, p. 13; E.M.D. 1925, p. 366; W.E.Z. 1927, p. 5; JEA 1928, p. 104). In southern Europe also found in grottoes (JEA l.c.; MÜL 1926, p. 117). In Denmark repeatedly found in burrows of moles (RSB, E.M. 1913, p. 41; West 1940, p. 19); in Norway several specimens have been recovered from tunnels of *Arvicola amphibius* (STA, N.E.T. 1933, p. 284). The species might actually be dependent on animal nests.

### Biology

Swedish catches: V: 5; VI: 8; VII: 6; VIII: 1; IX: 2; X: 1; XI: 1. Its distribution differs perceptibly from that of *discus*. The species is therefore, as assumed by LRS (1939, p. 385), probably a spring breeder hibernating as an adult, which is supported by the fact that in Germany immature beetles have been found in July and October (DTZ 1938, p. 43).

### Dynamics

Wings fully developed, and the beetle capable of flight. Observations on spontaneous flight: Vgl Dagsnäs, June 1939 (WRN); Ögl Tåkern, repeatedly observed (Palm); France (JEA 1928, p. 104).

### *Trechus obtusus* Er.

#### Distribution

(map in JEA 1927, p. 307)

*Sweden:* There are two small, widely separated areas. I. In the southeast: Skå Lomma (THS 1859, p. 211; 3 specimens, MB!); Stenshuvud, June 12, 1925, 1 specimen (ARW, coll. LTH). Öld Hornsjön, July 21, 1939, 1 specimen (JNS!). Gtl Slite, seashore, August 17, 1934, 1 specimen (LOH!); Fårön, at a sawmill, July 16, 1937, 3 specimens (SDH, 1 specimen, coll. LTH). II. In the fjelds on the Norwegian border: Hjd Tännadalen, Hamrafjäll, July 1938, 7 specimens (BRK,

O.E. 1941, p. 33!). Jtl Jorm, Jormliklumpen, July 12, 1932, 4 specimens (JNS and Palm, E.T. 1936, p. 184!). Lyl ("Lapp. Umensis," 1856, HGN, 1 specimen, coll. ZTT, ML!), Tärna, July 24, 1929, 1 specimen (NST, coll. LTH), Laxfjäll, 600 m above sea level, July 8, 1937, 1 specimen (Holm, coll. LTH).

Doubtful: Hll Falkenberg (RGS, E.T. 1913, p. 232; no voucher specimen).

Erroneous: Öld Vickley (LBH, N.E. 1936, p. 112; = *quadristriatus*!).

- 658 *Norway*: Occurs only in the west. I. Three localities in the environs of 7 Bergen, more than 500 m above sea level (SPS 1875, p. 20; 1901, p. 34; N.E.T. 1923, p. 255). II. Between the Trondheim region and well as far as latitude 70° N, many localities and the species is probably continuously distributed. Southern limit: 26 Hitra (N.E.T. 1923, p. 255; 1937, p. 145!); 27 Trondheim (N.E.T. 1937, p. 145!). Northern limit: 35 Reinöya (MKL 1881, p. 12, "*4-striatus*"). Nordfuglöy (SPS 1885a, p. 28; 1888–1889, p. 106; "*4-striatus*"). Only two inland records: 30 Skarmodal, 3 specimens and 32 Rössvatn, 1 specimen (STE, MO!). It is quite possible that the two subareas are actually connected since the outer fringe of the northern part of the western country has been poorly explored.

Absent in eastern Fennoscandia.

*Adjacent regions*: In Denmark widely distributed and not very rare, both in Jylland as well as on the islands (West 1940, p. 19, and in litt.); even on Bornholm (LOH!). The record from Latvia (Kurland; SDL 1872, 1891) is doubtful, since this species is otherwise absent throughout the eastern Baltic region. British Isles (Joy 1932, p. 343), also Ireland (JHS and HLB 1902, p. 589), Shetland and the Faeroes (West 1930, pp. 12–13). Iceland (LTH 1931, p. 170).

*Total area*: Euro-Mediterranean species (introduced in northwestern North America, according to JEA 1941–1942, p. 329). In Europe partly montane in Central Europe, east as far as Transylvania (PTI 1912, p. 19) and Albania (JEA 1927, p. 308), also in Italy, including Sicily (LUI 1929, p. 73), partly in the western part of southern Spain and the Balearic Islands (FUE 1919, p. 86), in the south as far as northern Germany, in the plains east as far as Mecklenburg and Mark Brandenburg (HOR 1941, p. 176). Northern Africa (JEA 1927). All records from the Caucasus and Siberia are erroneous according to JEA 1927.

### Ecology

This species differs from *quadristriatus* principally in being less xerophilous. It thus lives on moderately moist soil, usually with closed vegetation of the meadow type, at least in the fjelds not rare in the shade of *Salix* bushes or open stands of trees. In Iceland it is quite predominantly a meadow species, preferring stony, grassy soil with moderate moisture (LTH 1931, p. 171). In the fjelds occurs chiefly in the *reg. bet.*; the locality in Hjd is, however, situated



just above the timber line. In Central Europe predominantly montane and subalpine (E.M.D. 1925, p. 364; HOR 1941, p. 177). The assumption of LRS (1939, p. 385) that this species "probably lives to a great extent in burrows and nests of mice" is totally unsubstantiated.

### Biology

According to LRS (1939, pp. 326, 385), *obtusus*, like *quadristriatus*, is an autumn breeder, hibernating in the larval stage; most of the Danish specimens originate from the period July to September. Undoubtedly, however, at least a good percentage of adults also hibernate, because beetles have been observed in Denmark in large numbers in March and even on the Faeroes at the beginning of April (West 1930, p. 13).

### Dynamics

In our region, as generally in western and northern Europe, the beetle is always brachypterous and the wings reduced to a narrow scale. In southern Europe macropterous forms of the species are also found (JEA 1927, p. 308; HDH, *Rev. Franc. Ent.* 1936, p. 49).

\**Trehus quadristriatus* Schrk.  
(*minutus* Fbr.)

Distribution  
(map in JEA 1927, p. 298)

*Sweden*: Apparently continuously distributed throughout southern and central Sweden and in the coastal region as far as Ång. The gap in Gst and southern Hls is certainly only apparent. In the western coastal region as well as on Öld and Gtl, especially frequent. Delimiting localities: Vrm Arvika (RGS! LTH); Dlr Norrbärke, Vanbo, 1936 (KLF); Falun region, repeatedly found but singly (TJB! ARV! SJB); Hls Los, also 1933 (SJB); Jtl Ragunda (FRI, 3 specimens, VA!); Revsund, September 28, 1942 (BGW!); Ång Långsele, 1930, 1 specimen (LTH and Palm 1934, p. 36!); Österåsen, September 17, 1940, 1 specimen (BRD!); Ullånger, July 8, 1936, 1 specimen (LTH); Örnsköldsvik, July 9, 1936, 2 specimens (LTH).

Erroneous: Lapland (GLL 1896, p. 9).

*Norway*: Found especially in the southeast, north as far as 15 Teksle in Lyngdal; 2 Ringerike, 12 Gjøvik; 13 Fåberg. Westward, in the coastal region distributed continuously as far as 6 Jæren and Ryfylke (numerous localities; HLS 1915, p. 20), northernmost near 18 Saude in Ryfylke (HLS l.c.).

660 *Finland*: In southern and central Finland distributed without gaps, especially in the southwest (including Åland, and the islands east of it) very

frequent. North of latitude 62° N occurrence sparser. The northern boundary forms an oblique line, represented by the following localities: St Ytterö (KRG); Tb Virrat (KNG); Keuru (PHJ!); Viitasaari (LBG); Sb Kuopio (WLL); Iisalmi (STK); in Kb only near Hammaslahti (KTK, N.E. 1931, p. 39).

*Russian sector:* Found only in southernmost Karelia (PPP 1899a, p. 11), four localities in 1942 (several collectors!).

*Adjacent regions:* In Denmark everywhere and frequent (West 1940, p. 19). Estonia, including Ösel (SUM 1931; HAB in litt.; Palm!); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 343), also Ireland (JHS and HLB 1902, p. 589). Shetland (JEA 1927, p. 299).

*Total area:* Western Palearctic species. In Europe south as far as southern Spain and Balearic Islands (FUE 1919, p. 86), Corsica (DEV 1935, p. 31), southern Italy, Sardinia, Sicily (LUI 1929, p. 73), Greece and Crete (OTZ 1886, p. 206). Northern Africa (JEA 1927, p. 301). Asia Minor; Syria; Iran (JEA l.c.). The Caucasus (CHD 1846, p. 189; SDR and LDR 1873, p. 82). Western Turkestan (HEY 1880–1881, p. 47; JEA l.c.).

### Ecology

A xerophilous species in our region, living on dry, sun-exposed terrain with sparse vegetation, chiefly consisting of grasses, *Rumex acetosella*, and similar plants; also on sandy or gravelly soil, often with a more or less strong admixture of loam. Often in fallow land. It is sometimes frequent even among *Elymus* and *Psamma* on dune sand on the sea, together with *Dromius linearis* and *nigriventris*. It is generally most frequent in the coastal regions. Also in the grassy parts of the Alvar† on Öld and Gtl. However, it tolerates moderate shade and is encountered also among moss and leaf litter under *Salix* shrubs or at forest fringes, if the soil is dry (mostly sandy). In Central Europe the species seems to be more eurytopic than in our region, since it has also been recorded from shady and humid places, for instance, in forests and on shores (Dahl 1928, p. 83; Rapp 1933, p. 57; GRD 1937, p. 42), even in Denmark (according to LRS 1939, p. 385) “preferably on very moist soil of cultivated fields”. The species has been repeatedly found in nests and burrows of animals: Burrows of *Arvicola amphibius* (Ögl Kisa, July 27, 1934, 2 specimens, Palm! Oslo region, numerous; STA, N.E.T. 1933, p. 284; also see JEA l.c.); “burrows of mice” 661 (West 1940, p. 19); molehills (SLK, E.M. 1895, p. 116; also larvae; DTZ 1938, p. 42; JEA 1941–1942, p. 328). However, this insect cannot be completely dependent on animal nests (as is probably the case for *discus* and *micros*).

† (Plant community consisting typically of mosses and calciphilous herbaceous plants that grow on steppelike shallow alkaline soils overlying Scandinavian limestones; suppl. scient. edit.).

## Biology

Swedish catches: I: 1; II: 1; III: 8; IV: 8; V: 10; VI: 34; VII: 102; VIII: 87; IX: 14; X: 5; XI: 2. In Denmark where maximum abundance is likewise in July–August, numerous larvae were observed from March until May (one also at the beginning of July) (LRS 1939, p. 326). Numerous immature beetles found in June, beginning of June 9 (Gtl), and also on July 1 (Upl) and July 22 (Dsl). Autumn breeder with larval hibernation (l.c., p. 385); only a very small number of older beetles hibernate. From Central Europe larvae of *Aphodius* have been mentioned as prey of the beetles and larvae and, for the latter, also “worms” and mollusks (BLK 1925, p. 20; BUR 1939, p. 102).

## Dynamics

The species is always macropterous in our region; brachypterous specimens occur only in southern France (JEA 1927, p. 293; 1941–1942, p. 328). The beetle is fond of flying at night; observations: Skå Lund, August 23, 1939 (HZE!); Stockholm, August 1944 (HNS!); Gst Grönsinka (Palm); Hls Los, September 9, 1933 (SJB). From Central Europe there are so many observations on flight that their enumeration would be superfluous. A few specimens have been found in sea drift in Finland (PME 1944, p. 38).

## Fossil Record

England, postglacial (Bell 1922, p. 46).

### *\*Trechus (Epaphius) rivularis* Gyll.

## Distribution

*Sweden:* A rare and extremely local species with a highly split distribution. However, a continuous area from Skå to Jtl must be assumed. Skå Bökeberg (STB, coll. THS, MB!); Markie-hage (THS, MB!); Stehag (THS 1868, p. 291), 1885, 5 specimens (MLC, HM!); Skäralid, July 26, 1943, 1 specimen (BRK!). Små Södra-Sandsjö, Konga, June 15, 1926, 3 specimens (LOH, according to JNS); Högsby, Åsebo, June 6, 1932, 11 specimens (LOH!); Värnamo region, 662 four localities, June 1942, numerous (LOH!). Vgl Eggby, June 6, 1925, 1 specimen (LOH!); Kinnekulle (GYL 1810, p. 33). Dsl Fröskog, Tanakärret, June 15, 1938, 2 specimens (LOH, according to JNS). Nke Örebro region, two localities, even in 1927 (JNS, E.T. 1915, p. 203!). Ögl Kisa, Örneström, July 13, 1934, numerous (Palm!), Bjerkeryd, June 24, 1941, 1 specimen (LOH!). Sdm Åsgård (SDN, ERC, MG! PST, SU!), Upl Värmdön, Boda, July 30, 1934, 4 specimens (LTH), Vretakärr, June 30, 1941, numerous (LTH); Bogesund, Träsket, July 29, 1941, 2 specimens (LTH); Djursholm, Ösbysjön, numerous



(LTH 1943b, p. 131). Gst Ovensjö, Väsaren, 1936, numerous (Palm! LTH). Dir Hamra, numerous (JNS and SJB 1932, p. 17!). Hls Iggesund (WNG, E.T. 1880, p. 192). Jtl Revsund, June 18, 1943, 1 specimen (BGW!). Connected to the Finnish area, the northern locality of Nbt Kypäsjärvi, July 26, 1938, 7 specimens (LTH). The species is rarer and more widely distributed than presumed, but easily overlooked because of its special mode of life.

*Norway:* Found only in the extreme southeast. In Oslo region occurs at several places, among others Snaröya, Lysakermyra, Lutvatn in Öystre-Aker (SIE 1875, p. 89; HLS 1891a, p. 11; N.E.T. 1932, p. 83!). Additionally, only one locality: 12 Ullensaker, Elstadmoen, July 12, 1834 (N.E.T. l.c.).

*Finland:* Highly local but in the southern and central parts distributed apparently continuously. Predominantly an inland species, absent on all the islands and occurring apparently only accidentally at the seashore. It is not certain whether the gap in Nl and Ka is real. Northernmost localities: St Suodenniemi (ELF); Ta Ruovesi (SBJ, MÅ); Filppula (KNG); Tb Saarijärvi, Pyhähäkki (STK); Konginkangas (Luther, MH!); Sb Iisalmi (SBJ, MH!); Kb Nurmes (SBJ, MH!). Farther north two localities: Ob Uleåborg (WUO, MH!); Ylitornio (RNK 1938, p. 66).

*Russian sector:* Sv, three localities, immediately north of the mouth of the Swir (PPP 1899a, p. 11; MH! PME! PFF!). Kn Velikaja-guba (PPP l.c.; MH!).

*Adjacent regions:* In Denmark very rare, found only on Lolland and Sjaëlland (west 1940, p. 19). Doubtful in Estonia (SDL 1891); in Latvia near Cremon (SDL 1872, p. 33). Leningrad region (MAS 1903, p. xiii; BSK 1922, p. 55). British Isles, only England (Joy 1932 p. 344).

*Total area:* Solely European species with very restricted distribution. Markedly northern, outside the region occurring only in northern Germany, southwest as far as Rostock, Harz, Rhön, and one locality in Baden (HOR 1941, p. 174), and in Slovakia (ROU 1930, p. 131).

Almost stenotopic in swamps of bog forests of a particular type: strong shade of *Betula*, often also *Alnus glutinosa* or *Salix*, more rarely spruce; soil vegetation dominated by species of *Sphagnum*. Typical example: Upl Värmdön, Boda, at the edge of a small sphagnum bog; *Betula*, *Alnus glutinosa*, solitary pines; *Carex vesicaria* (dominant), *C. rostrata*, *C. leersi*, *Ledum*, *Vaccinium myrtillus*; large *Sphagnum* and solitary *Polytrichum commune* hummocks, dry only on the surface. Successive species: *Agonum fuliginosum* and *Pterostichus diligens* (predominant), *P. minor*, *P. nigrita*, *Patrobus assimilis*, *Agonum livens* and *obscurum* (LTH). MST has described a very similar biotope from Norway (N.E.T. 1932, p. 145). The insect lives in wet leaf litter between hummocks. According to RNK (1938, p. 66) in Finland it is found especially on highly humidified

“muddy soil” and hence especially in fern-rich swamps. For its secondary occurrence in a very different biotope in Upl, see LTH, 1943b (p. 131). I cannot support the statement by LRS (1939, p. 385) that the species is associated with borrows of *Arvicola*.

### Biology

Swedish catches: VI: 16; VII: 11; VIII: 2; IX: 0; X: 1; thus a distinct midsummer species. Immature beetles found only in June (7 specimens). Hibernation unquestionably takes place in the larval stage, as assumed by LRS (1939, p. 385). The beetle was observed feeding spontaneously on a Collembola (*Lepidocyrtus* ?) (Upl Djursholm, July 18, 1941, LTH).

### Dynamics

The species has been considered “wingless” to date (see JEA 1927, p. 140). Near Upl Djursholm, June 24, 1941 (biotope described by LTH 1943b, p. 131). However, I found one beetle with fully developed wings among numerous brachypterous individuals (in which the wings are reduced to a minute scale). Later I examined four beetles collected by PME (1944, p. 38) from sea drift near Nl Tvärminne, and all four were macropterous. Thus the macropterous form might actually be capable of flight. Because of the highly sporadic occurrence of such individuals, and above all the stenotopy of the species as  
664 mentioned above, its capability of dispersal must be rated very poor. Due to poor chitination, even the live insect is very fragile and highly susceptible to desiccation.

### Fossil Record

Bavaria, Hösbach, glacial (FLH 1884, p. 7).

\**Trechus rubens* Fbr.  
(*paludosus* Gyll.)

Distribution  
(map in JEA 1927, p. 179)

*Sweden*: Found in all provinces and absent only in the actual fjelds and northernmost Lapland. There seem to be no gaps in distribution, but in the extreme south the species is far scarcer and very local (in eastern Skå possibly totally absent). Southern delimiting localities: Skå Kämpinge, 1887 (PTT, LF); Trälleborg (THS 1867a, p. 26; ML!); Ble Ronneby, 1932 (Ljungbeck, ML!); Öld Stora-Rör (ERC, MG!); Gtl Atlingbo, Källgårds, 1927, 2 speci-

mens (LOH, according to JNS). Highest localities in Lapland: Åsl Stalon, 1936 (LTH); Lyl Sorsele, repeatedly found (GTZ, E.T. 1932, p. 49!); Pil Jäckvik, 1925 (LTH); Lul Jockmock, 1924 (LTH); Malmbergct (SJB), 1933 (HJG!); Tol Idivuoma, June 14, 1930, 1 specimen (BRC, RM!).

*Norway:* From the extreme south as far as latitude 70° N continuously but not densely distributed. Absent in the high fjelds, but otherwise gaps not apparent; its absence in the western part of the country north of Bergen is certainly due only to insufficient investigation. Northernmost localities: 35 Tromsö (SPS 1888–1889, p. 104); 36 Nordreisa, Snemyr (STE, MB!); 38 Bossekop, in Alta, June 1924, 3 specimens (MST, MO! also by STA). In 41 southern Varanger only one locality: Neiden (LYS, according to STA).

*Finland:* Distributed almost universally (also on Åland and other islands) but in the extreme north highly local. Northernmost localities: Lk Sodankylä (SUD, MH!); Muonio (SBJ 1873, p. 89; MH!); Pallastunturi (RNK 1938, p. 66); Li Kyrö (SBJ, MH!); Lp Kolttaköngäs (HLL!).

*Russian sector:* Lj Pjalitsa (PPP 1905, p. 91; MH!); Kc Kem (PPP 1899a, p. 11; MH!). In southern Karelia, four localities (PPP 1899a; MH! KRV! PME!).

665 *Adjacent regions:* In Denmark rare, occurring chiefly in Jylland, with only three localities additionally on Sjaëlland (West 1940, p. 19). Estonia, including Ösel (HAB in litt.; MKK, coll. CRP!); Latvia (SDL 1872; MIK 1905). Leningrad region (OBT 1876; JAC 1908). British Isles (Joy 1932, p. 344), also Ireland (JHS and HLB 1902, p. 589). Shetland (West 1930, p. 75). Iceland (LTH 1931, p. 171).

*Total area:* Circumpolar species. In Europe predominantly northern and rare especially in the Central European plain, and perhaps could be considered "boreo-montane" (erroneously considered a boreo-alpine species by JEA 1941–1942, p. 319), since it very often swarms in flight and consequently many solitary records in the plains are certainly of an accidental nature (see HOR 1941, p. 175; also JEA 1927, p. 182). South as far as eastern France (DEV 1935, p. 30), northern Italy (LUI 1929, p. 72), Bosnia (JEA 1927), Transylvania (PTI 1912, p. 19). In the northeast as far as Pechora (SBJ 1898, p. 388). Siberia (SBJ 1880, p. 47; RM!), east as far as Lena (JEA 1927). North America, Nova Scotia (LTH 1931, p. 171).

### Ecology <sup>4</sup>

A humidity- and shade-loving species. Nevertheless neither a distinct riparian nor forest species. On the contrary, found very often in open terrain but under dense, tall vegetation or deep in the soil under large stones. In general could be considered almost subterranean (HOR 1941, p. 175). It prefers to live in wet leaf litter, brushwood, etc., always very humid to dripping wet, and hence found on the banks of lakes and rivers, frequently the smallest brooks. Also



occurs in humid forests, for instance in the biotopes described for *rivularis*. Frequently (as on Iceland, LTH 1931) synanthropic under tall vegetation of weeds (including *Rumex crispus*); for example, repeatedly found in old rotten sacks, buried in soil on farms, especially near wells, and even in cellars (HLS 1915, p. 20). At water sawmills in wet piles of bark. The species prefers loamy soil but is also found in peat and humus. Primarily an animal of the high boreal forest region which, however, extends far southward. The fjeld region is reached in Hjd, Jtl, and northern Norway (e.g., Målselv), but to date there are no definite records from the *reg. bet.* In Denmark found in burrows of moles (West 1940, p. 19; HSN and LRS 1941, p. 100), but certainly not dependent on animal nests.

666

### Biology

Southern Swedish catches: II: 1; III: 1; IV: 0; V: 17; VI: 45; VII: 15; VIII: 10; IX: 4; X: 2. In Denmark (or Scandinavia?) three larvae recorded from the end of May to the end of July (LRS 1939, p. 326). Very numerous immature beetles between June 24 (Vrm) and August 16 (Dlr). As assumed by LRS (l.c.; p. 386), probably normally breeds in spring, hibernating only exceptionally in the larval stage. Its late appearance in spring is probably explained by its concealed mode of life.

### Dynamics

Wings fully developed and the beetle likes to fly in the evening. Flight observations are numerous—from Vgl, Dlr, Gst, Ång, Vbt, and Ik (N.E. 1922, p. 22), as well as from Germany (often in large numbers; see, for instance, E.B. 1920, p. 203). The Finnish sea-drift material contains numerous specimens (PME 1944, p. 38).

*\*Trechus (Epaphius) secalis* Payk.

### Distribution

(map in BCH 1938, no. 49)

*Sweden:* From Skå to central Vbt densely and continuously distributed. Northern limit unusually well delineated and represented by the following localities: Dlr Lima, repeatedly found (OLS!); Orsa, 1908 (UYT 1909, p. 297; and in litt.); Hls Los, 1938, not observed earlier (SJB); Ramsjö, 1943 (LDN!); Jtl Svenstavik, 1943 (LDN); Bräcke, Mordviken, 1936 (LTH); Revsund, 1941 (BGW!); Östersund region, several localities (several collectors!); Åre (AND, LF), 1840, 2 specimens (ZTT, ML!); Ulriksfors, 1936, 2 specimens (LTH); Ång Mellansel, 1930, 1 specimen (LTH and Palm, 1934, p. 36!); Lyl Lycksele, "pauca specimina" (ZTT 1840, p. 28; 1 specimen, ML!); Vbt Bastuträsk, July

18, 1936, numerous (LTH); Sikeå, July 12, 1936, 4 specimens (LTH).

*Norway*: South of the Arctic Circle, on the coast, and in the valleys almost universally distributed, and frequent even in the Trondheim region (N.E.T. 1937, p. 146). Northernmost localities: 28 Snåsa and 29 Otterøy (LYS in litt.); 31 Hemnes in Ranen (STE, MB!).

Doubtful: 36 Nordreisa (STE, 5 specimens, MB!). Locality labeling by  
667 STE appears quite reliable. However, this locality is so strange in view of the very thorough exploration of this part of the country, that a future verification seems necessary.

*Finland*: Southern and central parts, universally distributed. Northern limit rather well defined and represented by the following localities: Ob Hailuoto and Uleåborg (WUO 1910, p. 64; MH!); Iijoki (STN!); Ok Kajana (CRP!); Kb Valtimo (CRP, coll. LTH).

*Russian sector*: Several localities in southern Karelia, north as far as Kn Tiudie (PPP 1899a, p. 11; MH!).

*Adjacent regions*: In Denmark widely distributed (including Bornholm) and quite frequent (West 1940, p. 18) Estonia (HAB in litt.); Latvia (among others, SDL 1872). Leningrad region (OBT 1876). British Isles, but not on Ireland (Joy 1932, p. 343).

*Total area*: Palearctic species. In Europe south as far as southeastern France (DEV 1935, p. 30), northern Italy (LUI 1929, p. 72), Transylvania (PTI 1912, p. 22). Siberia (SBJ 1880, p. 21; PPP 1907d, p. 7), east as far as Trans-Baikal (JEA 1927, p. 134).

### Ecology

Predominantly a forest species, requiring shade, moderate to high humidity, and a more or less high humus content. Especially in the more southern parts of the region, lives mainly among leaf litter and brushwood in dense, moist deciduous or mixed forests with poor ground vegetation, preferably in the vicinity of water, for instance under *Alnus glutinosa*; in spruce and birch swamps in Finland occurs in large numbers (RNK 1938, p. 66). In the north and in Norway found more among roots of plants on open, moderately moist grassy and meadow soil with rather tall vegetation, but often at forest fringes. Distinct preference for loamy soil everywhere (also according to SBJ 1873, p. 90; RNK l.c.), but likewise lives on sand-mixed soil and on peat. It reaches the fjeld regions only in Jtl and Norway; however, there are no records from the *reg. bet.* In Germany occurs strangely enough on dry sandy soil as well (GRD 1937, p. 42), and in Denmark under *Calluna* (West 1940, p. 18), which happens only occasionally in our region. In Denmark two specimens were recovered once from a mouse nest (West l.c.); I do not know whether the following remarks are based on further recoveries of this type: "especially in or close to animal  
668 abodes" (HSN and LRS 1941, p. 100), and "probably... dependent on the

abodes of other animals" (LRS 1939, p. 386). These statements nevertheless are highly exaggerated.<sup>36</sup>

### Biology

Southern Swedish catches: IV: 2; V: 3; VI: 122; VII: 128; VIII: 72; IX: 21; X: 1. In Denmark maximum abundance in August, and two larvae were found at the beginning of May and one at the beginning of August (LRS 1939, p. 326). Very numerous immature beetles found between May 29 and July 8 (Små), by far most of them in June. It is a very typical autumn breeder, hibernating exclusively in the larval stage (l.c., p. 386).

### Dynamics

Wings always reduced to a small scale invisible to the naked eye. As an eurytopic species it possesses a fair capability of dispersal, however, especially in wooded regions.

\**Trichocellus cognatus* Gyll.  
(*deutschii* C.R. Sahlb.)

### Distribution

*Sweden*: A distinct northern, and widely distributed species. I. Continuously distributed from northernmost Lapland as far as Vrm: South of Vbt not found to date on the coast. Delimiting localities of the northern area: Vrm Alster, 1929 (ZRN!); Lundsberg, 1938, 2 specimens (WRN!); Lesjöfors, 1907 (ROS, 2 specimens, ML!); Dlr Lima, repeatedly found (OLS!); Floda, 1920 (TJB, E.T. 1928, p. 25!); Falun, 1918 (FRL!); Hls Färila, Enskogen, 1941 (LBL, RM!); Jtl Bispgården (RNS 1932, p. 292, "*Acupalpus* sp."!); Vbt Umeå, 1943, 3 specimens (Palm!); Holmsund, 1936 (LTH). II. In the south several sub-areas: Skå, eight localities in the southern half, north as far as Hälsingborg (MCH, 1 specimen, ML!); Råå, 1941, 1 specimen (HZE!); Herrevadskloster, 1 specimen (Roth, E.T. 1897, p. 133); Stehag (MLC, 11 specimens, HM!); east-  
669 ernmost near Sandhammaren (THS, 1 specimen, MB!). Öld (BOH, 5 specimens, RM! HGL, 5 specimens, coll. JNS!). Mörbylånga, in the harbor, June 29, 1928, 12 specimens (JNS!); Glömminge, Isgårde; Högby, Blälinge (BOH, manuscript in K.V. Ak.). Gtl (Belfrage, RM!), Lau, Nygårde, Seashore, August 6, 1942, 12 specimens (WSJ!); Stånga, May 26, 1916, 1 specimen (KMN, VA!). Små Åker, June 29, 1943, 1 specimen (BGW). Hll Fjärås (SDN, MG!). Vgl Göteborg region, several localities, occasionally frequent (several collectors!);

<sup>36</sup>Danish coleopterologists seem to suffer a little from "muromania". I cannot forget the expression on my friend Andr. Strand's face when, in an animated discussion on the mode of life of *Trachypachys*, a Danish colleague said: "It must indeed live in mouse nests."



Floda (several collectors!). Ögl Tåkern region, primarily in Dags-mosse, not rare (Palm!); Nässja, bank of Vatter, 1928, 1 specimen (Palm, coll. LTH). Upl Runmarö (HFS, 1 specimen LÖ!). Strangely this species seems to be absent in the southern Swedish highland.

Doubtful: Hls Iggesund (WNG, E.T. 1880, p. 192).

Erroneous: Nke Hammar (WNG l.c. = *placidus*, according to JNS in litt.).

*Norway*: I. In the south mainly an inland species, also in the fjelds. The area at present seems to be divided into two parts; however, it is possible that the gap will be filled by future collections (especially in the poorly explored Province 22). The coast is reached only at three places: In the region of Oslo Fjord, several localities (SIE 1875, p. 105; MO!); 6 Jåeren (HLS 1915, p. 32); and Trondheim region (N.E.T. 1937, p. 146). II. In the north almost universally distributed, northernmost near 37 Honningsvåg (several collectors), east as far as southern Varanger (frequent). Southernmost localities here: 30 Skarmodal (STE, MO!); 31 Sørherøy (SPS, according to STA).

*Finland*: Distribution highly discontinuous. I. North of latitude 64° N distributed continuously and probably without gaps (but to date not found in parts of Ob, Ks, and Lk), south as far as Om Oulainen (SDM, 1 specimen, MH!); Ok Säräisniemi (WUO, MH!); Kajana (CRP!). II. Farther south in widely separated places and almost exclusively in the coastal region. Om Jakobstad (LBG). Oa Ilmola (HMM, HM!). St Ytterö, May 6, 1 specimen, June 4, 3 specimens, 1931 (ELF!). Ab Lojo (KRG); Ni Tvärminne (WEG); in Helsinki region repeatedly found (several collectors!). The only true inland locality in the south is Tb Jyväskylä, August 8, 1942, 1 specimen (KRG!).

*Russian sector*: Several localities on the coasts of the Kola Peninsula, east as far as Lj Ponoj (MH!), but possibly with a true gap on the northern coast (PPP 1905, p. 98; MH! MÅ! and other collections). In Karelia on the White Sea; Kk Kouta (SBJ 1873, p. 133; MH!); Kc Tschuja (SBJ MH!); Solovetsk Island (LEV, MÅ!). Also near Kn Karhumäki, 1943 (KRV).

*Adjacent regions*: In Denmark both in eastern Jylland (including Hindsholm), and northeastern Sjaælland (West 1940, p. 31). Estonia, two localities in the southeast (MIK 1905; LCK in litt.). Latvia, two localities in Kurland (MIK 1905; LCK and MIK 1939). Leningrad region (MAS 1902, p. xlv). British Isles (Joy 1932, p. 348), also Ireland (JHS and HLB 1902, p. 566). Shetland (West 1930, p. 75). The Faeroes (West 1930, p. 21). Iceland (LTH 1931, p. 178).

*Total area*: Circumpolar species. In Europe markedly northern, south as far as Holland and Belgium (EVS 1898, p. 92; 1922, p. 35), Harz and Upper Silesia (HOR 1941, p. 243), Bohemia (Fleischer 1927, according to HOR l.c.). According to LUI (1929, p. 90) near Bolzano in northern Italy, which is improbable. Siberia (among others, SBJ 1880, p. 45; RM!), east as far as Lena (PPP 1906b, p. 65). North America, widely distributed (Leng 1920, p. 73; LTH 1931, p. 179). Greenland (HNR and LBK 1917, p. 487).

## Ecology

Primarily a species of the high boreal coniferous forest region, but not a pronounced forest species. On the contrary lives on more or less open soil, often at forest fringes or clearings, at moderate to very dry places with poor vegetation developed only in patches (often *Empetrum* or *Calluna*), in the north always on sandy moraines. Especially typical is the biotope described for *Miscodera*; it often lives together with *Bembidion grapei* also. In the fjelds regularly occurs in the *reg. bet.* In the lower *reg. alp.* found in Sweden to date only in Hjd (Nean, 1 specimen, WRN!) and in the Tol Kebnekaise region (BRD 1934, p. 228; 1941, 10 specimens, BGW!); also in the tundra of the Kola Peninsula (PPP 1905, pp. 17, 98), and in the true alpine region on Greenland (HNR and LBK 1917, p. 487). In southern Sweden the species prefers wetter places, especially bogs (Vgl Floda; Ögl Dags-mosse). This is still more pronounced in Denmark (SDT 1861, p. 183; LRS 1939, p. 419) and above all in Germany (Peus 1928, p. 577; HOR 1941, p. 243). On the other hand the species lives on the British Isles (as in our region in the north) on dry, heath-like soil (FWL 1887, p. 41; JHS and HLB 1902, p. 567). All records at the sea (see SDT l.c.; HSN and LRS 1941, p. 210; GRD 1937, p. 48; also in our region: Skå, Öld, Gtl, Upl) are certainly accidental.

671

## Biology

Southern Swedish catches: III: 1; IV: 4; V: 6; VI: 10; VII: 3; VIII: 1; IX: 4; X: 1. Numerous immature beetles found from July 11 (Vbt) to September 20 (Jtl). Undoubtedly as assumed by LRS (1939, p. 419), a spring breeder, hibernating as an adult.

## Dynamics

Wings fully developed. Upon exposure to strong lamp light, one beetle was induced to flight (Jtl Revsund, September 1943). Spontaneous flight observed in Thuringia (Rapp 1933, p. 91). Its occurrence in large numbers from time to time on the seashore (see above) is certainly due to drifting by wind.

*Trichocellus (Oreoxenus) mannerheimi* R.F. Sahlb.  
(*ponojensis* J. Sahlb., *Setiporus* Reitt.)

## Distribution

*Russian sector:* Only two localities in the extreme eastern part of Kola Peninsula: Lj Ponoj, August 1870, 2 specimens (SBJ 1873, p. 132; PPP 1905, p. 97; MH! MÅ!; also ENW, MH!); Triostrowa (KLM, MH!).

Absent in the rest of Fennoscandia and all the adjacent regions.

*Total area:* Palearctic species. The nominal subspecies is known outside the region only from Siberia (SBJ 1880, p. 44; RM! PPP 1906b, p. 65), east as far as Okhotsk (*loc. class.*, south as far as Baikal (PPP 1910a, p. 317). In the Austrian Alps of Carinthia *oreophilus* Dan. occurs, which can be considered, at most, a subspecies of *mannerheimi* (HOR 1941, p. 244; LTH 1943a, p. 36).

### Ecology

Occurs near Lj Ponoj in dry places of the tundra. Also in Siberia in dry sandy places, especially on sloping river banks; also lives in wooded regions in similar places (PPP 1906b, p. 64; 1910a, p. 316). In the Carinthian Alps *oreophilus* is exclusively alpine, for instance, under the sod of *Azalea procumbens* (HEB and MEX 1933, p. 97).

### Biology

Periods of development not known.

672

### Dynamics

Wings reduced in both Fennoscandian and Siberian specimens, as well as those from the Carinthian Alps (*oreophilus*). Narrow wing rudiment equal to slightly less than half the length of an elytron.

### \**Trichocellus placidus* Gyll.

#### Distribution

*Sweden:* Occurs throughout southern and central Sweden and continuously distributed in the Bothnian coastal region as far as the Finnish border. The lower density of dots (see map) in parts of Små and Vgl is undoubtedly due only to insufficient investigation; however, its almost total absence on the coast of Upl is peculiar (actual?). North of about latitude 61° N far rarer and distinctly local. Upper delimiting localities: Vrm Höljes, 1933 (Palm and LTH 1937, p. 119!); Dlr Rättvik, 1918 (TGR, VA!), 1936 (KLF); Hls Färila, 1941 (LBL, RM!); Jtl Ragunda (FRI, 5 specimens, VA!); Ång Mo, Moliden, 1939 (BRC, RM!); Nyåker (PST, MG!); Vbt Degerfors, Svartberget, 1940, 1 specimen (FRL!); Lövanger, 4 specimens, and Bureå, 6 specimens, 1936 (LTH); Nbt Piteå, 1936, 1 specimen (LTH); Luleå, Bergnäset, 1939, 1 specimen (LTH); Boden, 1938, 1 specimen (HEQ!); Råneå, Rörbäck, seashore, June 12, 1938, 1 specimen (LTH).

Doubtful: Dlr Idre (AND, 1 specimen, coll. PST, SU!).

Erroneous: Lapland (BOH, according to THS 1859, p. 286; no voucher specimen).



*Norway:* From the Swedish border well as far as latitude 70° N certainly continuously distributed. Predominantly in the coastal region; highest inland localities of the south: 12 Biri; 11 "northern Österdalen"; 24 Sörem in Vågå (MO!). Northernmost localities: 35 Tromsdal (SPS, according to STA); Nordfugløy, numerous, July 1884 (SPS 1885a, p. 29); 36 Nordreisa (STE, 7 specimens, MB!); 38 Bossekop in Alta (SNR 1862, p. 329, according to HEY 1866, p. 252; also by MST).

*Finland:* Southern and central parts almost universally distributed and frequent; north of latitude 64° N occurs almost only on the coast but extends as far as the Swedish border. The gap in Oa is certainly only apparent. In the province Al found only on Eckerö (PFF) and Kökar, Idö (STK). Northernmost localities; 673 Ok Kajana, 1 specimen (CRP!); Ob Hailuoto, Uleåborg; Haukipudas (WUO, MH!); Torneå (SBJ, MH!). Isolated near Lk Muonio: "Ad ripam fluminis Muoniensis post inundationem d. 25 Jun. unicum specimen inveni" (SBJ 1871b, p. 405; 1873, p. 133; 1 specimen, MH!).

*Russian sector:* Found only in southern Karelia. Several localities on the Swir River (several collectors!). Also near Ko Petrosavodsk, 1942 (KRV!).

Erroneous: Kc Tschuja (SBJ, according to PPP 1899a, p. 18; = *cognatus*, MH!).

*Adjacent regions:* In Denmark widely distributed (including Bornholm) and frequent (West 1940, p. 31). Estonia (HAB in litt.); Latvia (SDL 1872, inadvertently omitted in the 1891 work; LCK and MIK 1939). Leningrad region (OBT 1876). British Isles (Joy 1932, p. 348), also Ireland (JHS and HLB 1902, p. 566). The Faeroes (West 1930, p. 21).

*Total area:* Palearctic species. In Europe south as far as southeastern France (DEV 1935, p. 44), Austria (HOR 1941, p. 242), northern Italy (LUI 1929, p. 90), Hungary (KTY 1900, p. 38). The Caucasus (JAC 1905–1908, p. 388). Western Siberia (SBJ 1880, p. 45; RM!).

### Ecology

A typical deciduous forest species, requiring a distinct layer of humus in the soil. Its requirement for shade is not so strong as in *Calathus micropterus*, with which it frequently lives; hence also occurs in open grovelike stands, at forest fringes, under *Salix* shrubs, etc. Also at wooded seashores, e.g., under *Alnus glutinosa*. The requirements for ground vegetation and soil conditions and humidity reveal little specificity. It lives among moss and leaf litter, often gregariously, for example on large boulders, sometimes together with *Amara brunnea*, but usually at somewhat wetter places. However, it avoids very wet forest swamps; thus it is found only sporadically in the forested swamps of Finland (RNK 1938, p. 67). In western Norway and the Faeroes the species seems to live in more open terrain. In Central Europe also it is fairly eurytopic (Dahl 1928, p. 170).

## Biology

Southern Swedish catches: II: 4; III: 12; IV: 41; V: 93; VI: 140; VII: 48; VIII: 27; IX: 46; X: 23; XI: 10; XII: 3. In Denmark where the maximum abundance occurs already in April–May, three larvae were found in July (LRS 1939, p. 343). Numerous immature beetles found between June 27 (Vrm) and October 5 (Sdm), but strangely to date none in August. It is, however, undoubtedly a spring breeder (l.c., p. 419), hibernating at least normally as an adult.

## Dynamics

Wings fully developed (comparatively almost as well developed as in *cognatus*) and certainly functional. Flight observations absent however, and my numerous attempts to induce the beetle to flight upon exposure to sun were not successful. In Finland, however, 10 specimens have been found in sea drift (Frey 1937, p. 436; PME 1944, p. 38).

## Fossil Record

Finland (Ik), postglacial (PPP 1911, p. 36).

\**Zabrus tenebrioides* Gze.  
(*gibbus* Fbr.)

## Distribution

*Sweden*: Found exclusively in Skå and only in the west, except for a locality that is not completely reliable (see below). Trälleborg, repeatedly 1862–1888 (THS 1867a, p. 55; MLF, MG! Roth, ML!); Håslöv, 1882–1887, numerous (PTT, numerous collectors!); Kungstorp, (LTH); between Malmö and Kävlinge found by various collectors in several localities since 1835, near Lund at least as late as in 1941 (CHR! Already reported by MCK 1835, p. 3); Hälsingborg, September 1887 (MLC, 1 specimen HM!).

Doubtful: Skå “Årup, June” (GAD, 1 specimen, LJ! see *Harpalus calceatus*).

Absent in the rest of Fennoscandia.

*Adjacent regions*: In Denmark local but widely distributed, both in eastern Jylland and on the islands, including Bornholm, occasionally in considerable numbers (West 1940, p. 37, and in litt.). Absent in Estonia; on the other hand found in Latvia, near Riga (SDL 1872, 1891) and in the southeast (ULN 1884). In Leningrad region not known to the best of my knowledge. British Isles, only England p. 345).

*Total area*: Western Palearctic species. In Europe south as far as central Spain and the Balearic Islands (FUE 1920, p. 149), southern Italy (LUI 1929,

p. 104), Greece (OTZ 1886, p. 210). East as far as Volga (JAC 1905–1908, p. 366). Asia Minor (JAC l.c.). Syria and Cyprus (JEA 1941–1942, p. 952). The Caucasus (CHD 1846, p. 155; SDR and LDR 1878, p. 75; LSH 1936, p. 142). Turkmenia (according to CKI 1927–1933, p. 1272). Western Turkestan (HEY 1896, p. 17).

### Ecology

The few Swedish catches were made in loamy fields of wheat and rye or in their vicinity. In Central Europe considerable literature has been published on this well-known pest of cereals (see, for instance, BUR 1939, p. 127). In general, as in our region, a preference for loamy soil has been mentioned (KTT 1873–1874, p. 83; S.E.Z. 1876, p. 400; WHF 1881, p. 30), and according to other reports sandy soil (SDT 1841, p. 165; GRD 1937, p. 46). It is predominantly a culture species, occurring only rarely outside cultivated fields (B.E.Z. 1861, p. 192; West 1940, p. 37).

### Biology

The few dated Swedish collections range from May to September, but of a total of 39 specimens no less than 31 were caught in August. In Denmark, rich in material, the highest number was recorded in July; numerous larvae were observed there in April, and immature beetles at the beginning of June (LRS 1939, p. 338). It is thus an autumn breeder, hibernating in the larval stage (l.c., p. 411). In the southern part of Central Europe the beetles may also hibernate (BUR 1939, p. 128). The diet is predominantly vegetarian and in the case of fully mature beetles consists chiefly of grains of wheat, also rye, and more rarely barley; in Denmark also observed feeding on ears of a wild species of *Schedonorus* (West 1940, p. 37). Additionally feeds on worms, insects, etc.; in captivity it greedily consumed horse meat (GRD 1937, p. 28). The larvae, which cause the maximum damage, attack in particular the leaves of young cereal plants; also observed feeding on a larva of *Anisoplia* (LTZ 1847–1852, p. 239).

676

### Dynamics

Wings fully developed but the beetle is said to fly only rarely. Flight has been observed in Central Europe (SOR 1932, p. 89; BUR 1939, p. 128). In Elberfeld found "in gas tanks" (CRN 1884, p. 11; see p. 15 above).

### Variation

In northern and Central Europe the species is homogeneous (*forma typica*); in southern Europe and western Asia different subspecies are found.



## Bibliography

References which contain primary data on recent carabids of Fennoscandia and adjacent regions are indicated by the following letters at the end of the entry:

- B = Baltic States
- D = Denmark
- F = Finland
- N = Norway
- R = Russian sector of Fennoscandia
- S = Sweden

Articles in solely entomological Nordic journals which pertain to the fauna of their own countries, have generally not been included (see Chapter II: Material).

For a list of the journals consulted, see Chapter II.

Names of places of publication are those in current usage.

- Andersson, Gunnar 1898: Studier öfver Finlands torfmossar och fossila kvartärflora.—Fennia. 15. Hfors.
- Apfelbeck, V. 1904: Die Käferfauna der Balkanhalbinsel. I.—Berlin.
- Bach, M. 1851: Käferfauna für Nord- und Mitteldeutschland & c. I.—Koblenz.
- Baekmann, I. 1908: Notiz über einige Käfer aus Süd-Karelien.—Medd. Soc. Fauna Fl. Fenn. 34 (1907). Hfors.—F.
- Bänninger, M. 1923: Versuch einer Bestimmungstabelle der zentral- und ostasiatischen *Nebria*-Arten & c.—Kol. Rundschau. 10. Wien.
- — 1925: Neunter Beitrag zur Kenntnis der Carabinae: die Nebriini.—Ent. Mitt. 14. Berlin-Dahlem.
- — 1930: Die Gattung *Pelophila* Dej. (Col. Carab.).—Notulae Ent. 10. Hfors.
- — 1931: Über Carabinae, Ergänzungen und Berichtigungen.—Deutsch. Ent. Zeitschr. Berlin.
- Bänninger, M., Netolitzky, F. & Schauburger, E. 1929: Carabidae.—Ent. Erg. schwed. Kamtsch.-Exp.—Ark. f. zool. 20 B. Sthlm.

- Barner, K. 1937: Die Cicindeliden und Carabiden der Umgebung von Minden und Bielefeld I.—Abh. Mus. Naturkunde. 8. Münster i. W.
- Barner, K. & Peetz, F. 1933: Über die Käferfauna des Naturschutzgebietes Kipshagen.—6. Ber. Naturw. Verein (Festschr.). Bielefeld.
- Barovski, V. 1908 a: In Horae Soc. Ent. Ross. 38. Leningrad.
- — 1908 b, 1909, 1922, 1925: In Revue Russe d'Ent. 8. 9. 18. 19. Jaroslaw.
- Bau, A. 1879: Entomologische Notizen aus dem schwedischen Lappland.—Isis. 4. Berlin.—S.
- Beare, Th. H. 1930: A Catalogue of the recorded Coleoptera of the British Isles.—London.
- Bedel, L. 1895—1914: Catalogue raisonné des Coléoptères du Nord de l'Afrique. 1.—Paris.
- Bell, A. 1888—Postglacial Insects.—The Entomologist. 21. London.
- — 1922: On the Pleistocene and Later Tertiary British Insects.—Ann. Rep. Yorksh. Phil. Soc. (1921). Yorkshire.
- Bengtsson, Simon 1904: Reisebericht. In K. Vet. Ak. Årsbok. Sthlm.—N.
- — 1927: Die Larven der nordischen Arten von Carabus Lin.—K. Fysiogr. Sällsk. Handl. 39. Lund.—S.
- Beyle, M. 1901: Über ein altes Torfmoor im hohen Elbufer vor Schulau.—Verh. Ver. Naturw. Unterhalt. 11. Hamburg.
- Blair, K.G. 1924: Some coleopterous remains from the peat-bed at Wolvercote, Oxfordshire.—Trans. Ent. Soc. London.
- Blunck, H. 1925: Syllabus der Insektenbiologie. Coleopteren. 1.—Berlin.
- Bodemeyer, B.v. 1927 a, b, c: Ueber meine entomologischen Reisen. I, II, IV.—Stuttgart.
- Boheman, C.H. 1844: Resa i Luleå Lappmark.—Ofvers. K. Vet. Ak. Förh. 1. Sthlm.—S.
- — 1849: Bidrag till Gottlands Insekt-fauna.—K. Vet. Ak. Handl. Sthlm.—S.
- — 1850: Bidrag till Gottlands insekt-fauna.—Öfvers. K. Vet. Ak. Förh. Sthlm.—S.
- — 1851: Entomologiska Anteckningar under en resa i Södra Sverige 1851.—K. Vet. Ak. Handl. Sthlm.—S.
- — 1857: Till Lapplands entomologi.—Öfvers. K. Vet. Ak. Förh. 14. Sthlm.—S.
- — 1863: Entomologiska anteckningar under en resa i norra Skåne och södra Halland år 1862.—Ibidem.—S.
- — 1867: Bidrag till Gottlands Insekt-fauna.—Ibidem.—S.
- Borchert, W. 1938: Die Verbreitung der Käfer Deutschlands. Tatsachen und Folgerungen.—Schönebeck (Elbe).
- Born, P. 1898: Carabus catenulatus nov. var. Wockei.—Soc. Ent. 13, Nr 10. Zürich.—N.
- — 1908: Zoogeographisch-carabologische Studien.—Ent. Wochenbl. 25. Leipzig.—S, N.

- — 1926: Die Carabenfauna Norwegens.—Norsk. Ent. Tidsskr. 2. Oslo.—S, N.
- Brammanis, L. 1930: Zur Kenntnis der Coleopterenfauna des Saatkampeschutzgrabens in der Oberforstei lntschukalns (Hinzenberg).—Folia Zool. Hydrobiol. 2. Riga.—B.
- Brauns, H. 1879: Nachträge zum Verzeichnisse der Käfer Mecklenburgs von Clasen.—Arch. Ver. Freunde Naturgesch. 32. Neubrandenburg.
- Breuning, St. v. 1927, 1928 b, 1928 a: Monographie der Gattung Calosoma Web.—Koleopt. Rundschau. 13. 14.—Ent. Zeit. 44.—Wien.
- — 1932–36: Monographie der Gattung Carabus L.—Best.-Tab. europ. Coleopt. 104–110. Troppau.
- Brinck, P. 1943: En linnéansk insekt återfunnen i Skåne.—Skånes Natur. Lund.—S.
- Brundin, L. 1931: Skalbaggas—Coleoptera.—Insektfaunan inom Abisko Nationalpark. I.—K. Vet. Ak. Skr. i Naturskyddsår. 16. Sthlm.—S.
- — 1934: Die Coleopteren des Torneträskgebietes. Ein Beitrag zur Ökologie und Geschichte der Käferwelt in Schwedisch-Lappland.—Lund.—S.
- — 1942: Zur Limnologie Jämtländischer Seen.—Mitt. Anst. Binnenfischerei Drottningholm. 20. Sthlm.—S.
- Brunier, B. De 1931: Le petit peuple des sablières. Bledius et Dyschirius.—Miscell. Ent. 33. Toulouse.
- Burgess, A.F. & Collins, C.W. 1917: The Genus Calosoma & c.—Bull. U.S. Dep. Agric. 417. Washington.
- Burmeister, Fr. 1939: Biologie, Ökologie und Verbreitung der europäischen Käfer, I.—Krefeld.
- Caillol, H. 1908: Catalogue des Coléoptères de Provence.—Ann. Soc. Sci. Provence. 1. Marseille.
- Cajander, A.K. 1897: In Medd. Soc. Fauna Fl. Fenn. 23 (p. 48). Hfors.—F.
- Catalogus Coleopterorum Daniae et Fennoscandiae, 1939.—Soc. Fauna Fl. Fenn. Hfors.—S, N, F, R, D.
- Cederström, C. 1873: Entomologiska anteckningar.—Öfvers. K. Vet. Ak. Förh. 29. Sthlm.—S.
- Champion, G.C. 1890: Notes on the Coleoptera and Lepidoptera of Norway.—Ent. M. Mag. London.—N.
- — 1899: Coleoptera collected in Finmark by Dr. T.A. Chapman and Mr. R.W. Lloyd.—Ibidem.—N.
- Chaudoir, M. De (& Hochhuth, H.) 1846: Enumeration des Carabiques et Hydrocanthares recueillis pendant un voyage au Caucase &c.—Kiew.
- Christy, W. 1837: Notes of a Voyage to Alten, Hammerfest &c.—Ent. Mag. 4. London.—N.
- Clasen, F.W. 1853: Uebersicht der Käfer Mecklenburgs.—Arch. Ver. Freunde Naturgesch. Mecklenb. 7. Neubrandenburg.



- Collett, R. 1868: Zoologisk-botaniske Observationer fra Hvaleerne.—Nyt Mag. f. Naturv, 15. Oslo.—N.
- Cornelius, C. 1884: Verzeichniss der Käfer von Elberfeld und dessen Nachbarschaft.—Jahresber. Naturw. Verein. 6. Elberfeld.
- Csiki, E. 1927–33: Carabinae und Harpalinae.—Junk & Schenkling, Coleopt. Catal. 91, 92, 97, 98, 104, 112, 115, 121, 124, 126, 127.—Berlin.
- Dahl, K., Lid, J. & Munster, Th. 1924: A division of Norway into bio-geographical sectional areas.—Vid. Selsk. Skr. I. Klasse. Oslo.
- Dahl, T. (Mrozek-) 1925: Beiträge zur Kenntnis der Oekologie der deutschen Carabiden.—Mitt. Zool. Mus. 12. Berlin.
- — 1928: Coleoptera oder Käfer. I: Carabidae (Laufkäfer).—Dahl: Die Tierwelt Deutschlands &c. 7.—Jena.
- Dahms, W. 1928: Vorläufiges Verzeichnis der bei Oelde i. W. bis 1927 aufgefundenen Käfer.—Jahresber. Naturw. Verein. 5. Bielefeld.
- Dalla-Torre, K.W. v. 1879: Die Käferfauna von Oberösterreich.—Jahresber. Ver. Naturkunde Oesterr. ob der Ens. 10. Linz.
- Dampf, A. 1924: Zur Kenntnis der estländischen Hochmoorfauna. II.—Sitz.-Ber. Naturf. Gesellsch. Univers. 31. Dorpat.—B.
- De Geer, Ch. 1774: Memoires pour servir a l'histoire des Insectes. 4.—Sthlm.—S.
- Dietze, H. 1936–39: Die Cicindelidae und Carabidae des Leipziger Gebietes (unvollendet).—Mitt. Ent. Gesellsch. 14–17. Halle.
- Eggers, H. 1901: Verzeichniss der in der Umgegend von Eisleben beobachteten Käfer.—Insektenbörse. 18. Leipzig.
- Ehnberg, K.J. 1892: In Medd. Soc. Fauna Fl. Fenn. 18 (p. 208). Hfors.—F.
- Eichler, W. 1922: Verzeichnis der in Kleinasiatischen Sandschaks Trapezunt &c. gesammelten Coleopteren.—Polsk. Pismo Ent. 1. Lwów.
- — 1930 a: Coléoptères du Gouv. Eriwan (Caucase méridional).—Ibidem. 8.
- — 1930 b: Coleoptera der Umgebung von Tiflis.—Ibidem. 9.
- Eisen, G. & Stuxberg, A. 1868: Bidrag till kännedom om Gotska Sandön.—Öfvers. K. Vet. Ak. Förh. Sthlm.—S.
- Ekman, S. 1922: Djurvärldens utbredningshistoria på skandinaviska halvön.—Sthlm.
- Enwald, R. 1883, 1886: In Medd. Soc. Fauna Fl. Fenn. 9 (p. 139). 13 (p. 258). Hfors.—F, R.
- Erichson, W.F. 1837: Die Käfer der Mark Brandenburg. 1.—Berlin.
- Erikson, Johan 1900: Det öländska alfwarets naturförhållanden.—Svenska Turistfören. Årsskr. Sthlm.—S.
- Everts, E. 1898, 1922: Coleoptera Neerlandica. 1. 3.—Haag.
- Fabricius, J.C. 1779: Reise nach Norwegen.—Hamburg.—S, N.
- Fallén, C.F. 1802: Observationes Entomologicae. 1.—Lund.—S.

- Fellman, Jacob 1906: Anteckningar under min vistelse i Lappmarken. 4.—Hfors.—F.
- Findal, J.K. 1935: Laesø.—Flora og Fauna. Aarhus.—D.
- Flach, K. 1884: Die Käfer der unterpleistocänen Ablagerungen bei Hösbach unweit Aschaffenburg.—Verh. phys.-med. Ges. (N.F.) 18. Würzburg.
- Fliche, P. 1875: Sur les lignites quaternaires de Jarville près de Nancy.—C.R. Ac. Sci. 80. Paris.
- Forsslund, K.H. 1943: Studier över det lägre djurlivet i nordsvensk skogsmark.—Medd. Statens Skogsf.-anst. 34. Sthlm.—S.
- Fowler, W.W. 1887, 1913: The Coleoptera of the British Islands. I. VI.—London.
- Franck, P. 1936: Über einige Käfer der deutschen Küsten.—Ent. Blätter. 32. Krefeld.—S, F, D.
- Frey, R. 1913: Beitrag zur Kenntnis der Arthropoden-Fauna im Winter.—Medd. Soc. Fauna Fl. Fenn. 39. Hfors.—F.
- — 1915 a: Coleopterologiska notiser.—Ibidem. 41.—F.
- — 1915 b, 1916, 1918 b: Ibidem. 41 (p. 129). 42 (p. 15). 44 (p. 209).—F.
- — 1917: Entomologiska anteckningar från norra Savolaks.—Ibidem. 43.—F.
- — 1918 a: Om på senaste tid företagna entomologiska exkursioner i Åbotrakten.—Ibidem. 44.—F.
- — 1937: Einige Massenvorkommnisse von Insekten an der Südküste Finnlands während des Sommers 1935.—Acta Soc. Fauna Fl. Fenn. 60. Hfors.—F.
- Friederichs, K. 1901: Neue mecklenburgische Käfer.—Arch. Ver. Freunde Naturgesch. 55. Güstrow.
- — 1907: Ueber Verbreitung u. Lebensweise einiger Käfer, insbes. Chrysomeliden.—Ibidem. 61.
- Fröhlich, C. 1897: Die Käfer.—Beitr. zur Fauna von Aschaffenburg und Umgegend.—Jena.
- Fuente, J.M. De La 1918–1921: Catalogo sistematico-geografico de los Coleopteros en la peninsula iberica &c.—Bol. Soc. Ent. España. 1–3. Zaragoza.
- Gallois, J. 1886: Catalogue des Coléoptères de Maine-et-Loire.—Soc. Linn. Lyon. Angers.
- Ganglbauer, L. 1892: Die Käfer von Mitteleuropa. I.—Wien.
- Gavoy, L. 1897: Catalogue des Insects Coléoptères dans le Dép. de l'Aude.—Bull. Soc. d'Études Sci. de l'Aude. 8. Carcassonne.
- Geilenkeuser, W. 1896: Nachtrag zu dem "Verzeichnis der Käfer von Elberfeld etc."—Jahresber. Naturw. Ver. 8 (Jubil.-Festschr.). Elberfeld.
- Gerhardt, J. 1910: Verzeichnis der Käfer Schlesiens. 3. Aufl.—Berlin.
- Gersdorf, E. 1937: Ökologisch-faunistische Untersuchungen über die Carabiden der mecklenburgischen Landschaft.—Zool. Jahrb. (Abt. Syst.). 70. Jena.

- Gridelli, E. 1931: Osservazioni sul *Bembidion obtusum* e specie affini.—Mem. Soc. Ent. Ital. 10. Genova.
- Grill, Cl. 1896: *Catalogus Coleopterorum Scandinaviae, Daniae et Fenniae*.—Sthlm.—S, N, F, R, D.
- Gyllenhaal, L. 1810, 1813, 1827: *Insecta Svecica*. II, III, IV.—Skara.—S.
- Haberman, H. 1935 a: *Mardikate esmasleide Eestis*. III.—Eesti Loodus. Dorpat.—B.
- — 1935 b: *Keblaste tammik*.—Ibidem.—B.
- — 1936 a: *Andmeid Kuusnõmme bioloogiajaama ümbruse mardikalistest*.—Eesti Lood. Arhiiv (II). 16. Dorpat.—B.
- — 1936 b: *Mardikate esmasleide Eestist*. IV.—Eesti Loodus. Dorpat.—B.
- — 1937 a: *Läänemaa selgrootud*.—Dorpat.—B.
- — 1937 b: *Treppoja (The Treppoja Brook)*.—Eesti Loodus. Dorpat.—B.
- — 1938: *Kostivere urgete loomastikust (On the fauna of the Kostivere caverns)*.—Ibidem.—B.
- Haberman, H., Määr, A. & Zolk, K. 1933: *Mardikate esmasleide Eestist*. (The First Coleoptera found in Eesti).—Ibidem.—B.
- Hagemann, A. 1887: *Forstenthomologisk Undersøgelse af Kystdistrikterne i Nedenaes og Lister & Mandals Amter*.—Forstforen. Aarbog. Oslo.—N.
- Hainmüller, C. 1929: *Ergänzungen zur Käferfauna Mecklenburgs*.—Arch. Ver. Freunde Naturgesch. Meckl. (N. F.) 4. Rostock.
- Hansen, V. & Larsson, S.G. 1941: *Sandspringere og Løbebiller*.—Danm. Fauna. 47. Kbhvn.—D.
- Hartmann, F. 1924: *Beiträge zu Badens Käferfauna*. III.—Mitt. Bad. Landesver. Naturk. (N.F.) 1. Freiburg i. Br.
- Heberdey, R. & Meinert, J. 1933: *Die Adephagen der östlichen Hälfte der Ostalpen*.—Verh. Zool.-Bot. Ges. 83. Wien.
- Helenius, A.G. 1900: *För Finland nya Coleoptera*.—Ent. tidskr. 21. Sthlm.—N.
- Hellén, W. 1920, 1921 b: In *Medd. Soc. Fauna Fl. Fenn.* 45 (p. 274). 46 (p. 83). Hfors.—F, R.
- — 1921 a: *Anmärkningsvärda skalbaggar från Finland*.—Ibidem. 47.—F.
- — 1929: *För Finland nya eller sällsynta Coleoptera*.—Memor. Soc. Fauna Fl. Fenn. 5. Hfors.—F.
- — 1933: *Fem för Finland nya skalbaggar från utöarna i Finska viken*.—Ibidem. 9.—F.
- — 1934: *Die Carabenfauna Finnlands*.—Notulae Ent. 14. Hfors.—N, F.
- Hellén, W. 1935: *Dyschirius angustatus* Ahr. funnen i Finland.—Memor. Soc. Fauna Fl. Fenn. II. Hfors.—F.
- — 1936: *Platynus gracilipes* Duft., en för Finland ny skalbagge.—Ibidem.—F.
- Helliesen, T. 1891 a, 1892 a, 1893 a, 1900: *Bidrag til Kundskaben om Norges coleopterfauna*. I–III, VII.—Stav. Mus. Aarsber. (1890–92, 1899). Stavanger.—N.



- — 1891 b, 1892 b, 1893 b, 1894: (Käfer-Verz. aus Jaeren und Ryfylke).—Ibidem (1890–93).—N.
- — 1910, 1911, 1912, 1913, 1914: Nogle nye norske Coleoptera.—Stav. Mus. Aarshefte. 20–24 (1909–13). Stavanger.—N.
- — 1915: Stavanger Amts Coleoptera.—Ibidem (1914).—N.
- Henriksen, K.L. 1933: Undersøgelser over Danmark—Skånes kvartaere Insekt-fauna.—Vid. Medd. Dansk Naturh. Foren. 96. Kbhvn.—S, N, F, D.
- Henriksen, K.L. & Lundbeck, W. 1917: Grønlands Landarthropoder.—Medd. om Grøn. 22. Kbhvn.
- Henseler, C. 1938: Die deutschen Carabus-Arten.—Decheniana. 97 B. Bonn.
- Heyden, L. v. 1866: Bemerkungen über die von Dr. Staudinger und Dr. Wocke in Finnmarken gefundenen Coleopteren.—Ent. Zeit. Stettin.—N.
- — 1880–81, 1893, 1896, 1898: Catalog der Coleopteren von Sibirien. Nebst Suppl. I–III. (Deutsch. Ent. Gesellsch.).—Berlin.
- — 1903: Beiträge zur Coleopteren-Fauna der nordwestlichen Teile Russlands.—Korr.-Blatt Naturf. Ver. 46. Riga.—B.
- Hjelt, O.E.A. 1896: Naturalhistoriens studium vid Åbo Universitet.—Åbo Univ. Lärdomshist. 6 (Svenska Litt.-Sällsk. i Finl. 32).—Hfors.—F.
- Hoffmann, A. 1925: Vertikale Verbreitung der Caraben und Erörterung über geflügelte Caraben.—Ent. Anzeiger. 5. Wien.
- Holdhaus, K. 1912: Monographie der paläarktischen Arten der Coleopteren-gattung Microlestes.—Denkschr. Math.-Naturw. Klasse K. Ak. d. Wiss. 88. Wien.
- — 1924: Das Tyrrenhisproblem.—Ann. Nat. Mus. 37. Wien.
- — 1932: Die boreoalpinen Arten der Gattung Bembidium Latr.—Livres de Centenaire, Soc. Ent. France. Paris.
- Holdhaus, K. & Lindroth, C.H. 1939: Die europäischen Coleopteren mit boreoalpiner Verbreitung.—Ann. Nat. Mus. 50. Wien.—S, N, F, R, D, B.
- Holmgren, A.E. 1853: Entomologiska excursioner vid en del af Vetterns östra strand.—Öfvers. K. Vet. Ak. Förhandl. Sthlm.—S.
- Horion, A. 1935 a: Nachtrag zu Fauna Germanica.—Krefeld.
- — 1935 b: Die Salzkäfer der Rheinprovinz.—Decheniana. 91. Bonn.
- — 1937: Die rheinischen Arten der Tribus Bembidiini. (Col. Carabidae). 3.—Ibidem. 95 B.
- — 1941: Faunistik der deutschen Käfer. I.—Wien.
- Horn, W. 1926: Cicindelinae.—Junk & Schenkling, Coleopt. Catal. 86. Berlin.
- Horn, W. & Kahle, I. 1935–37: Über entomologische Sammlungen, Entomologen und Entomo-Museologi.—Berlin.
- Ischreyt, G. 1927: Zur Quellenfauna Kurlands.—Korr.-Blatt Naturf. Ver. 59. Riga.—B.
- Jacobson, G.G. 1903, 1908: In Horae Soc. Ent. Ross. 36. 38. Leningrad.
- — 1905–08: Die Käfer Russlands &c. 3–6. (Russisch).—Leningrad.

- Jänner, G. 1905: Die Thüringer Laufkäfer.—Ent. Jahrb. (Krancker). Leipzig.
- Jansson, Anton 1922: Faunistiska och biologiska studier över insektlivet vid Hornsjön på norra Öland.—Ark. f. zool. 14. Uppsala.—S.
- — 1925: Die Insekten-, Myriopoden- und Isopodenfauna der Gotska Sandön.—Örebro.—S.
- — 1926: Coleopteren aus dem Sarekgebiet.—Naturw. Unters. des Sarekgeb. 4. Sthlm.—S.
- — 1933: Förteckning över Bornholms Coleoptera &c.—Ent. tidskr. 54. Sthlm.—D.
- Jansson, A. & Sjöberg, O. 1932: Bidrag till kännedomen om insektfaunan i Hamra Nationalpark.—K. Vet. Ak. Skr. i Naturskyddsår. 20. Sthlm.—S.
- Jeannel, R. 1926, 1927, 1928: Monographie des Trechinae.—L'Abeille. 32. 33. 35. Paris.
- — 1937: Notes sur les Carabiques. I. Le genre *Nebria* Latreille.—Revue Franc. d'Ent. 4. Paris.
- — 1940: Les Calosomes.—Mém. Mus. Nat. Hist. Nat. (N.S.) 13.1. Paris.
- — 1941–42: Coléoptères Carabiques.—Faune de France. 39, 40.—Paris.
- Jensen-Haarup, A.C. 1893: Danmarks Løbebiller.—Flora og Fauna. Aarhus.—D.
- Jessen, K. & Rasmussen, R. 1922: Et Profil gennem en Tørvemose paa Faerøerne.—Dansk Geol. Unders. (4. R.) 1. Kbhvn.
- Johnson, W.F. & Halbert, J.N. 1902: A list of the Beetles of Ireland.—Proc. R. Irish Ac. (3) 6. Dublin.
- Joy, N.H. 1932: A Practical Handbook of British Beetles. I.—London.
- Julin, J. 1792: Bref om de uti Österbotten, särdeles omkring Uhleåborg samlade Naturalier.—Ny Journ. uti Hushålln. Sthlm.—F.
- Junck & Schenkling, Catalogus, s. Csiki und Horn.
- Kemner, N.A. 1912, 1913: Beiträge zur Kenntnis einiger schwedischen Kolenpterenlarven. I. III.—Ark. f. zool. 7. 8. Uppsala.—S.
- Kittel, G. 1873–74: Systematische Uebersicht der Käfer, welche in Baiern und der nächsten Umgebung vorkommen.—Corr.-Blatt. zool.-miner. Verein. 27. 28. Regensburg.
- Klinckowström, A. 1909: En sommar i Frostviksfjällen.—Fauna och Flora. Uppsala.—S.
- Kolbe, H. 1932: Fossile Coleopteren aus präglazialer und spätglazialer Zeit Süd-Schwedens.—Ent. Medd. 18. Kbhvn.
- Kolbe, W. 1927: Beiträge zur schlesischen Käferfauna.—Zeitschr. f. Ent. 15. Breslau.
- Kontkanen, P. 1929: *Elaphrus* (*Elaphroterus*) *Jakovlevi* Sem. &c.—Luonnon Ystäv. Hfors.—F.
- Kranck, H. 1928: Alands skalbaggar i urval.—Åbo.—F.
- Krauss, H. 1905: Beiträge zur Kolenpterenfauna der Fränkischen Schweiz.—Ent. Jahrb. (Krancker). Leipzig.

- Krogerus, R. 1925 a: För Finlands fauna nya skalbaggar från Ladoga-Karelen och Karelska näset.—Medd. Soc. Fauna Fl. Fenn. 48. Hfors.—F.
- — 1925 b: Berättelse över en resa företagen sommaren 1923 för utforskande av arthropodfaunan på Karelska näsets dynamråden.—Ibidem. 50.—F.
- — 1925 c: På karelska näset (Ik) under sommaren 1923 insamlade, från denna provins icke tidigare kända coleoptera.—Ibidem.—F.
- — 1925 d: Studien über Lebensweise und Entwicklung einiger Bledius-Arten.—Acta Soc. Fauna Fl. Fenn. 56. Hfors.—F.
- — 1925 e: Weitere Beiträge zur Kenntnis der Biologie und Verbreitung einiger Bledius- und Dyschirius-Arten.—Notulae Ent. 5. Hfors.—F, B.
- — 1927 a: Om några för Finlands fauna nya Bledius-former.—Memor. Soc. Fauna Fl. Fenn. 1. Hfors.—F.
- — 1927 b: Tre för Finland nya skalbaggsformer.—Ibidem. 2.—F.
- — 1929: Beobachtungen über Bledius- und Dyschirius-Arten auf Degersand (Al. Eckerö).—Ibidem. 5. Hfors.—F.
- — 1932: Über die Ökologie und Verbreitung der Arthropoden der Trieb-sandgebiete an den Küsten Finnlands.—Acta Zool. Fenn. 12. Hfors.—F.
- — 1937: Mikroklima und Artverteilung.—Acta Soc. Fauna Fl. Fenn. 60. Hfors.—F.
- — 1939: Zur Ökologie nordischer Moortiere.—VII. Internat. Kongr. f. Ent. (1938). Berlin.—F.
- Krogerus, R. & Lemberg, B. 1927: Berättelse över en sommaren 1926 företagen resa till utöarna i Finska viken samt till Bottniska vikens kuster.—Memor. Soc. Fauna Fl. Fenn. 3. Hfors.—F.
- Kühnelt, W. 1941: Revision der Laufkäfergattungen Patrobus und Diplous.—Ann. Nat. Mus. 51. Wien.
- Kuthy, D. 1900: Coleoptera.—Fauna Regni Hungariae. III. (R. Soc. Scient. Nat. Hung.). Budapest.
- Laamanen, M. 1938: Katsaus Ruissalon tammistojen kovakuoriaiseläimistöön.—Ann. Univ. Turku. (A) 6. Åbo.—F.
- Lackschewitz, Th. 1927: Zur Koleopterenfauna des Ostbaltischen Gebietes. I.—Korr.-Blatt. Naturf. Ver. 59. Riga.—B.
- Lackschewitz, Th. & Mikutowicz, J.M. 1939: Zur Koleopterenfauna des Ostbaltischen Gebietes, II.—Ibidem. 63.—B.
- Landin, B.O. 1944: Bombarderbaggen, ett intressant inslag i vår skalbaggs-fauna.—Svensk Faunist. Revy. 6. Sthlm.—S.
- Lapouge, G. De 1902: Degré d'évolution du genre Carabus à l'époque du pléistocène moyen.—Bull. Soc. Sc. & Med. Ouest. 11. Rennes.
- — 1903: Carabes de la tourbe des Alluvions anciennes &c. de Soignies.—Ann. Soc. Ent. Belg. 47. Bruxelles.
- Larsen, Ellinor Bro 1936: Biologische Studien über die tunnelgrabenden Käfer auf Skallingen.—Vid. Medd. Dansk. Naturh. Foren. 100. Kbhvn.—D.



- Larsson, S.G. 1939: Entwicklungstypen und Entwicklungszeiten der dänischen Carabiden.—Ent. Medd. 20. Kbhvn.—D.
- — 1940: Sandspringernes forekomsttider i Danmark.—Ibidem.—D.
- Lauterborn, R. 1933: Faunistische Beobachtungen aus dem Gebiete des Oberrheins und des Bodensees.—Mitt. Bad. Landesver. Naturk. (Beiträge). 2 (N.F.). Freiburg i. Br.
- Leino, A. 1938: Naantalin ympäristön merenrantojen kovakuoriaiseläimistöä.—Ann. Univ. Turku. (A) 6. Åbo.—F.
- Leng, Ch. W. 1920: Catalogue of the Coleoptera of America, north of Mexico.—Mount Vernon, N. Y.
- Lengerken, H. v. 1929: Die Salzkäfer der Nord- und Ostseeküste &c. Leipzig.
- Lentz, F.L. 1857: Neues Verzeichnis der Preussischen Käfer.—Neues Preuss. Prov.-Blatt. II. Königsberg.
- — 1879: Catalog der Preussischen Käfer.—Beitr. zur Naturk. Preussens. 4. Königsberg.
- Lesne, P. 1918 a: Insectes subfossiles des tourbières sousmarines de Belle-Île.—Bull. Mus. Hist. Nat. 24. Paris.
- — 1918 b: La faune entomologique subfossile des tourbières sousmarines de Belle-Île.—C.R. Ac. Sci. 167. Paris.
- — 1925: Sur la faune des alluvions tourbeuses de la vallée de la Seine au sud de Paris.—Ibidem. 180.
- Letzner, K. 1847–52: Systematische Beschreibung der Laufkäfer Schlesiens.—Zeitschr. f. Ent. Breslau.
- — 1885–92: Verzeichniss der Käfer Schlesiens. 2. Aufl. (J. Gerhardt).—Ibidem.
- Levander, K.M. 1913: Ett bidrag till kännedomen om vår vinterfauna.—Medd. Soc. Fauna Fl. Fenn. 39. Hfors.—F.
- Lie-Pettersen, O. 1904: Entomologiske bidrag til skjaergaardsfaunaen i det vestlige Norge.—Bergens Mus. Aarb. Bergen.—N.
- Lindberg, Harald 1936: Bidrag till kännedomen om skalbaggsfaunan i Sverige.—Notulae Ent. 16. Hfors.—S.
- Lindberg, Håkan 1917: Tvåför faunan nya skalbaggar.—Medd. Soc. Fauna Fl. Fenn. 43. Hfors.—F.
- — 1924 a: Bidrag till kännedomen om åländska ögruppens skalbaggsfauna.—Ibidem. 48.—F.
- — 1924 b: Käferfunde aus Nuckö und Wormsö an der estländischen Westküste.—Notulae Ent. 4. Hfors.—B.
- — 1925: Insektekologiska iakttagelser på Åland.—Medd. Soc. Fauna Fl. Fenn. 49. Hfors.—F.
- — 1927: Zur Ökologie und Faunistik der subalpinen und alpinen Käferwelt in Enonteki-Lappmark.—Acta Soc. Fauna Fl. Fenn. 56. Hfors.—S, F.
- — 1931: Die Küstenkäfer Finnlands.—Memor. Soc. Fauna Fl. Fenn. 7. Hfors.—F.

- — 1932: Käfer gesammelt in Lettland 1931.—Folia Zool. Hydrobiol. 4. Riga.—B.
- — 1933: Untersuchungen in N-Petsamo über die Käferfauna hochnordischer Biotopen.—Memor. Soc. Fauna Fl. Fenn. 9. Hfors.—F.
- — 1934: Wasser- und Uferkäfer auf Rågöarna und bei Baltischport an der Estländischen NW-Küste.—Ibidem. 10.—B.
- Lindroth, C.H. 1931: Die Insektenfauna Islands und ihre Probleme.—Zool. Bidrag. 13. Uppsala.
- — 1932: Über fünf Coleopteren-Arten C.G. Thomsons &c.—Ent. tidskr. 53. Sthlm.—S, N.
- — 1935 a: Die Coleopterenfauna am See Pjeskejaure im Schwedischen Lappland.—Ark. f. zool. 28 A. Sthlm.—S, N.
- — 1935 b: The Boreo-British Coleoptera. A study of the faunistical connections between the British Isles and Scandinavia.—Zooeographica. 2. Jena.—S, N, F, R, D, B.
- — 1935 c: Zur Systematik fennoskandischer Carabiden. I. Subg. Ophonus Steph.—Ent. tidskr. 56. Sthlm.—S, N, F.
- — 1935 d: The British Species of Ophonus Steph.—Ent. M. Mag. 71. London.
- — 1938: Revision der Carabidae in Zetterstedt's "Insecta Lapponica".—Opusc. Ent. 3. Lund.—S, N, F.
- — 1939 a: Die skandinavische Käferfauna als Ergebnis der letzten Vereinigung.  
—VII. Internat. Kongr. f. Ent. (1938). Berlin.—S, N, F, R.
- — 1939 b: Zur Systematik fennoskandischer Carabiden. 2–3. (*Nebria nivalis*, *Elaphrus tuberculatus*).—Ent. tidskr. 60. Sthlm.—S, N, F, R.
- — 1939–40: Zur Systematik fennoskandischer Carabiden. 4–12. Bembidionstudien.—Notulae Ent. 19. Hfors.—S, N, F, R.
- — 1941: Endemismus in der fennoskandischen Fauna erläutert an der Fam. Carabidae.—Zool. Bidrag. 20. Uppsala.—S, N, F, R.
- — 1942 a: Carabidae.—Svensk Insektfauna. 35. Sthlm.—S, N, F, D.
- — 1942 b: Ett subfossilfynd av *Calosoma sycophanta*.—Pop. Biol. Revy. Sthlm.—S, D.
- — 1943 a: Zur Systematik fennoskandischer Carabiden. 13–33.—Ent. tidskr. 64. Sthlm.—S, N, F, R, B, D.
- — 1943 b: *Oodes gracilis* Villa. Eine thermophile Carabide Schwedens.—Notulae Ent. 22. Hfors.—S, N, F, R.
- — 1943 c: Über *Amara littorea* C.G. Thoms. (Carab.).—Ent. Blätter. 39. Krefeld.—S, N, F, R.
- — 1944: *Bembidion tinctum* Zett. (*nigripes* Mnh.) und *dentellum* Thbg.—Ent. tidskr. 65. Sthlm.—S, N, F, R.
- Lindroth, C.H. & Palm, Th. 1934: Bidrag till kännedom om coleopterfaunan i Övre Norrlands kustland.—Gbgs K. Vet. Vitt. Samh. Handl. (B) 4. Göteborg.—S.

- Linné, C. v. 1761: Fauna Svecica. 2. Aufl.—Sthlm.—S.
- Lomnicki, J.R. v. 1893: Materialien zur Verbreitung der Carabinen in Galizien. —Abh. Zool.-Bot. Ges. 43. Wien.
- Lomnicki, A.M. 1894: Fauna pleistocenica insectorum boryslaviensium. (Polnisch.)—Muz. Im. Dzieduczyckich. 4. Lwów.
- — 1913: Catalogus Coleopterorum Poloniae.—Kosmos. 38. Lwów.—B.
- — 1914, s. Schille.
- Luigioni, P. 1929: I Coleotteri d'Italia.—Mem. Pont. Ac. Scienze. (II) 13. Rom.
- Lundblad, O. 1927: Skadedjur i Sverige åren 1922–1926.—Medd. 317. Centralanst. försöksväs. jordbr. Sthlm.—S.
- — 1928: Skadedjur i Sverige år 1927.—Ibidem. 337.—S.
- Lundblad, O. & Tullgren, A. 1923: Skadedjur i Sverige 1917–1921.—Ibidem. 249.—S.
- Lutshnik, V. 1936: The Carabidae of Anapa, Caucase.—Folia Zool. Hydrobiol. 9. Riga.
- Lysholm, B. 1896, 1899: Bidrag til kundskaben om Coleopterfaunaen i det Trondhjemske. I. II.—K. Norske Vid. Selsk. Skr. Trondheim.—N.
- Måklin, F.W. 1869: Några notiser om insektfaunan i trakten af staden Petrosawodsk.—Öfvers. Finska Vet.-Soc. Förh. 11. Hfors.—R.
- — 1881: Coleoptera insamlade under den Nordenskiöldska expeditionen 1875 &c.—K. Vet. Ak. Handl. 18. Sthlm.
- Makólski, J. 1928: In Polskie Pismo Ent. 7. Lwów.
- Makólski, J. & Smreczynski, St. 1936: Les Coléoptères du pleistocène de Leki Dolne près Pilzno.—C.R. Ac. Pol. Sci. Lettr. 6. Kraków.
- Mandl, K. 1931: Systematische Zusammenstellung einer Sammelausbeute aus Transbaikalien und dem Ussurigeiete.—Ent. Zeit. 48. Wien.
- — 1935, 1936: Vorarbeiten für eine monographische Neubearbeitung der paläarktischen Cicindelen.—Arb. morph. taxon. Ent. 2. Berlin-Dahlem.
- Mannerheim, C.G. 1843: Mémoire sur la récolte d'Insectes Coléoptères en 1842.—Bull. Soc. Natural. 16. Moskwa.—F.
- — 1844 a: Mémoire &c.— — —en 1843.—Ibidem. 17.—F.
- — 1844 b: Description de quelques nouvelles espèces de Coléoptères de Finlande.—Ibidem.—F.
- Masaraki, V.V. 1902, 1903, 1906: In Horae Soc. Ent. Ross. 35. 36. 37. Leningrad.
- Mazur, E. 1922: In Polskie Pismo Ent. 1. Lwów.
- Meunier, F. 1901: Über einige Coleopteren-Flügeldecken aus der präglacialen Braunkohle und dem interglacialen Torflager von Lauenburg (Elbe). —Jahrb. K. Preuss. Geol. Landesanst. u. Bergak. 21 (1900). Königsberg.
- Meyer, P. 1943: Beiträge zum Vorkommen der Carabiden-Gattung Bembidion Latr. in der Ostmark.—Mitt. Ent. Ges. 33. München.
- Mikutowicz, J.M. 1905, 1911: Zur Koeopterenfauna der Ostseeprovinzen Russlands. 1. 2.—Korr.-Blatt. Naturf. Ver. 48. 54. Riga.—B.



- Mjöberg, E. 1905: Biologiska och morfologiska studier öfver Fåröns insekt-fauna.—Ark. f. zool. 2 Sthlm.—S.
- — 1906: Om några svenska insekters biologi och utveckling.—Ibidem. 3.—S.
- — 1916: Über die Insektenreste der sogen. "Härnögyttja" im nördlichen Schweden.—Sveriges Geol. Unders. (C) 268. Sthlm.
- Moberg, A. 1857: Naturhistoriska daganteckningar gjorda i Finland Åren 1750 —1845.—Notiser Sällsk. Fauna Fl. Fenn. 3. Hfors.—F.
- Möller, Gustaf 1863: Kort beskrifning öfver Skandinaviens Skalbaggar (Coleoptera). I.—Lund.—S.
- Möller, L. 1862: Fauna Mulhusana. Coleoptera.—Zeitschr. Gesamt. Naturw. 20. Halle.
- Morisonson, A.S. 1873: Entomologiska bidrag till Kinnekulles fauna.—Gbgg K. Vet. Vitt. Samh. Handl. 12. Göteborg.—S.
- Muethel, K. 1889: In Korr.-Blatt. Naturf. Ver. 32. Riga.—B.
- Mühlen, M. zur & Schneider, G. 1920: Der See Wirzjerv in Livland.—Dorpat. —B.
- Müller, J. (G.) 1918: Bestimmungstabelle der Bembidion-Arten Europas und des Mittelmeergebietes.—Kol. Rundschau. 7. Wien.
- — 1922: Bestimmungstabelle der Dyschirius-Arten Europas &c.—Ibidem. 10.
- — 1926: I Coleotteri della Venezia Giulia.—Studi Ent. 1. Triest.
- — 1933: Carabiden-Studien. IV.—Kol. Rundschau. 19. Wien.
- Munck Af Rosenschöld, E. 1835: Prodrömus faunae Coleopterorum Lunden-sis.
- Diss.—Lund.—S.
- Munster, Th. 1918: Nebria brevicollis Fbr. og naerstaende arter.—Forh. 16. Skand. Naturf. mete 1916. Oslo.—S, N.
- — 1922: Notiophilus Duméril. De norske arter.—Norsk Ent. Tidsskr. 1. Oslo.—N, R.
- Munster, Th. 1923: Notiophilus Duméril. Yderligere bemerkninger.—Ibidem. —N, F, R.
- — 1927 a: To bidrag til Norges koleopterfauna. II. Vore arter av slakten Amara Bon.—Nyt Mag. f. Naturv. 65. Oslo.—N.
- — 1927 b: Tillaeg og bemerkninger til Norges koleopterfauna.—Norsk Ent. Tidsskr. 2. Oslo.—S, N.
- — 1934: Agonum aldanicum Popp. und A. consimile Gyll.—Notulae Ent. 14. Hfors.—N, F.
- Naezen, D.E. 1794: Beskrifning på några vid Umeåfundne Insecter &c.—K. Vet. Ak. Nya Handl. 15. Sthlm.—S.
- Nathorst, A.G. 1894: Die Entdeckung einer fossilen Glacialflora in Sachsen &c.—Öfvers. K. Vet. Ak. Förh. 51. Sthlm.

- Natvig, L.R. 1916: Coleopterfaunaen i Larvik og omegn.—Nyt Mag. f. Naturv. 54. Oslo.—N.
- Nessling, E. 1927: Intressanta fynd av skalbaggar &c.—Memor. Soc. Fauna Fl. Fenn. 2. Hfors.—F.
- Netolitzky, Fr. 1912, 1913 b, 1914 b, 1915, 1916, 1923, 1931, 1932, 1933, 1934, 1936, 1937 b, 1938, 1939: Verbreitungskarten von Bembidion-Arten (teilweise mit P. Meyer zusammen)†.—Ent. Blätter. Krefeld.—S, N, F, R, D, B.
- — 1913 a: Bembidion-Studien (Carabidae). Das Subgenus Plataphus Motsch.—Ent. Zeit. 32. Wien.
- — 1914 a: Die Bembidiini in Winklers Catalogus.—Ent. Blätter. 10. Berlin.
- — 1918: Neue Bembidiini in Europas.—Kol. Rundschau. 7. Wien.
- — 1921: Catalogus systematicus specierum palaearticarum generis Bembidion Latr.—Arch. f. Naturgesch. 87 (A). 7. Berlin.
- — 1925: Fragestellungen aus der Insektengeographie.—Verh. Zool.-Bot. Ges. 74–75. Wien.—N.
- — 1926: Neue europäische und asiatische Bembidion-Arten. A. Die Rassen des Bembidion (Phila) obtusum Serv.—Kol. Rundschau. 12. Wien.
- — 1929: Zoogeographische Ueberraschungen in der Carabidengruppe Bembidiini.—Ibidem. 15.—N.
- — 1930: Beiträge zur Kenntnis der Bembidiini. I. Bembidion saxatile und seine Verwandten.—Ibidem. 16.—N, F.
- — 1935: Die Bembidion-Arten der Sammlung Motschulsky &c. —Vereinsschr. Ges. Luxemb. Naturfreunde. Luxemburg.
- — 1937 a: Zur Kenntnis der europäischen Gruppe des Bembidion Andreae F.—Ent. Blätter. 33. Krefeld.—S, F, D.
- — 1940: Bestimmungstabelle der Bembidion-Arten Europas, Asiens und Afrikas. (Unvollendet.)—Bul. Fac. Stiinte. 13. Cernauti.
- — 1942–43: Bestimmungstabelle der Bembidion-Arten des paläarktischen Gebietes.—Kol. Rundschau. 28, 29. Wien.
- Netolitzky, Fr. & Meyer, P. 1932: Die Verbreitung des Bembidion humerale Strm.—Ibidem. 18.
- Netolitzky, Fr & Vogel, G. 1916: Die Bembidiini Ostpreussens.—Schr. Phys.-ökon. Ges. Königsberg. 57. Leipzig & Berlin.
- Nordman, A.F. 1944: Rovbaggarna Amara aulica Panz. och A. plebeja Gyll. som blombesökare.—Mem. Soc. Fauna. Fl. Fenn. 19. Hfors.—F.
- Notini, G. 1943: Den grå kråkan (Corvus cornix L.). Näringsekologiska studier.—Medd. Svenska Jägarförb. 7. Uppsala.—S.
- Nyblaeus, O. 1842: Förteckning öfver Stockholmstraktens Coleoptrrer.—K. Vet. Ak. Handl. (1840). Sthlm—S.

†(Distribution maps of species of Bembidion (in part together with P. Meyer); suppl. scient. edit.).

- Nürnberg, W. 1929: Neue und weniger häufige Carabiden aus dem südlichen Mecklenburg.—Arch. Ver. Freunde Naturgesch. (N. F.) 4. Rostock.
- — 1933: Faunistische Notizen zu den Carabiden Mecklenburgs nebst biologischen Anmerkungen.—Ibidem. 7.
- — 1934: *Amara fusca* Dej. (Col.) in Mecklenburg.—Ibidem. 8.
- Obert, J. 1876: Verzeichnis der bis jetzt in St. Petersburg und Umgebung beobachteten Käfer. (Russisch.)—Trudy Soc. Ent. Ross. 8. Leningrad.
- Oertzen, E. v. 1886: Verzeichniss der Coleopteren Griechenlands und Cretas.—Berl. Ent. Zeitschr. 30. Berlin.
- Ogijewicz, B. 1931: Beitrag zur Kenntnis der Coleopterenfauna d. Umgebung von Wilno und Troki.—Trav. Soc. Sci. Lettr. (Trav. Inst. Zool. 21). Wilna.
- O'Mahony, E. 1929: Coleoptera.—In Report rec. add. Irish Fauna and Flora.—Proc. R. Irish Ac. 39. Dublin.
- Palm, Th. 1935: Coleopterologiska studier på ön Ven.—Gbggs K. Vet. Vitt. Samh. Handl. (B) 4. Göteborg.—S.
- — 1939: *Tachys bisulcatus* Nic. in Nordeuropa.—Ent. Blätter. 35. Krefeld.—S.
- — 1943: Einige Käferfunde aus Estland.—Notulae Ent. 22. Hfors.—B.
- Palm, Th. & Lindroth, C.H. 1936: Coleopterfaunan vid Klarälven. I. Allmän del.—Ark. f. zool. 28 A. Sthlm.—S, N.
- — — 1937: Coleopterfaunan vid Klarälven. II. Speziell del.—Ent. tid-skr. 58. Sthlm.—S, N.
- Palmén, E. 1944: Die anemohydrochore Ausbreitung der Insekten als zoogeographischer Faktor.—Ann. Zool. Soc. Vanamo. 10. Hfors.—F, R.
- Palmén, E. & Platonoff, St. 1943: Zur Autökologie und Verbreitung der ostfennoskandischen Flussuferkäfer &c.—Ann. Ent. Fenn. 9. Hfors.—F, R.
- Paykull, G. De 1790: Monographia Caraborum.—Uppsala.—S.
- — 1798–1800: Fauna Svecica. I–III.—Uppsala.—S.
- Petri, K. 1891: Ueber den Stand der Coleopterenfauna der Umgebung Schässburs.—Verh. u. Mitt. Siebenb. Ver. f. Naturw. Hermannstadt.—N.
- — 1912: Siebenbürgens Käferfauna.—Hermannstadt.
- Petry, A. 1914: Über die Käfer des Brockens.—Ent. Mitt. 3. Berlin-Dahlem.
- Peus, Fr. 1928: Beiträge zur Kenntnis der Tierwelt nordwestdeutscher Hochmoore.—Zeitschrift nordwestdeutscher Hochmoore.—Zeitschr. Morph. Ökol. d. Tiere. 12. Berlin.
- Platonoff, St. 1943: Zur Kenntnis der Käferfauna um den See Paanajärvi in Kuusamo, Nordfinnland.—Notulae Ent. 23. Hfors.—F.
- Polentz, G. 1937, 1939: Beiträge zur schlesischen Käferfauna.—Zeitschr. f. Ent. 18. Breslau.
- — 1938: Beiträge zur schlesischen Käferfauna.—Mitt Ent. Ges. 16. Halle.
- Pomeranzew, D. 1908: In Horae Soc. Ent. Ross. 38. Leningrad.
- Poppius, B. 1895, 1901: In Medd. Soc. Fauna Fl. Fenn. 21 (p. 14). 27 (p. 74). Hfors.—F, R.



- — 1899 a: Förteckning öfver Ryska Karelens Coleoptera.—Acta Soc. Fauna Fl. Fenn. 18. Hfors.—R.
- — 1899 b: In Medd. Soc. Fauna Fl. Fenn. 25 (p. 43). Hfors.—N.
- — 1905: Kola-Halföns och Enare Lappmarks Coleoptera.—Festschr. f. Palmén. Hfors.—N, F, R.
- — 1906 a: Suomen Petokuoriaiset. Carnivori Fenniae.—Vanamon Kirjoja. 10. Hfors.—F, R.
- — 1906 b: Beiträge zur Kenntniss der Coleopteren-Fauna des Lena-Thales in Ost-Sibirien.—Öfvers. Finska Vet. Soc. Förh. 48. Hfors.
- — 1906 c: Zur Kenntnis der Pterostichen-Untergattung Cryobius Chaud.—Acta Soc. Fauna Fl. Fenn. 28. Hfors.—R.
- — 1907 a: Zur Kenntnis der finländischen Arten der Gattung Notiophilus Dum.—Medd. Soc. Fauna Fl. Fenn. 33 (p. 47). Hfors.—F, R.
- — 1907 b: Zur Synonymik einiger nordeuropäischer und sibirischer Carabiden.—Ibidem.—F.
- — 1907 c: Beiträge zur Kenntnis der Coleopteren-fauna des nordöstlichen europäischen Russlands.—Ann. Mus. Zool. 10. Leningrad.
- — 1907 d: Beiträge zur Kenntnis der Carabiden-Fauna von West-Sibirien und der NW Mongolei.—Öfvers. Finska Vet. Soc. Förh. 49. Hfors.
- — 1908: Weitere Beiträge zur Kenntnis der Coleopteren-Fauna des Nordöstlichen Europäischen Russlands.—Acta Soc. Fauna Fl. Fenn. 31. Hfors.
- — 1909: Die Coleopteren-Fauna der Halbinsel Kanin.—Ibidem.
- — 1910 a: Die Coleopteren des arktischen Gebietes.—Fauna Arctica. 5. —Jena.
- — 1910 b: Beitrag zur Coleopterenfauna des äussersten Nordens von Sibirien.—Mém. Ac. Imp. Sci. (8) 18.9. Leningrad.
- — 1911: Beiträge zur postglazialen Einwanderung der Käfer-Fauna Finnlands.—Acta Soc. Fauna Fl. Fenn. 34. Hfors.
- Porath, C.O. v. 1870: Redogörelse för en under sommaren 1868 utförd zoologisk resa till Skåne och Blekinge.—Öfvers. K. Vet. Ak. Förh. 26. Sthlm.—S.
- Porra, J. 1938: Särkisalón pitäjän perunakellarien kovakuoriaiseläimistöä.—Ann. Univ. Tur. (A) 6. Åbo.—F.
- Porta, A. 1923, 1934: Fauna Coleopterorum Italica. I. u. Suppl.—Piacenza.
- Puel, L. 1938: Les Agonum paléarctiques.—Misc. Ent. 46. Toulouse.
- Rapp, O. 1933: Die Käfer Thüringens unter besonderer Berücksichtigung der faunistisch-oekologischen Geographie. I.—Erfurt.
- Rathlef, H. v. 1905: Coleoptera Baltica. Käferverzeichnis der Ostseeprovinzen.—Arch. f. Naturk. Liv-, Est- und Kurlands (II. Ser.). 12. Dorpat.—B.
- — 1906 a: Erster coleopterologischer Bericht zur Kenntnis der nordlivländischen Seen.—Sitz.-ber. Naturf.-Ges. Univ. 14. ("Materialien z. Erf. d. Seen Livlands", 3). Dorpat.—B.
- — 1906 b: Neue baltische Coleopteren.—Ibidem. 15.—B.

- — 1921: II. Supplementum zu den Coleoptera Baltica.—Ibidem. 25 (1916–17).—B.
- Reid, Cl. 1890: The pliocene deposits of Britain.—Mem. Geol. Survey. London.
- Reitter, E. 1870: Uebersicht der Käfer-Fauna von Mähren und Schlesien.—Verh. Naturf. Ver. 8. Brno.
- — 1900: Harpalini (Best.-Tab. europ. Coleopt.).—Ibidem. 38 (1899).
- — 1907: Übersicht der mir bekannten Arten des Coleopteren-Genus *Agonum* Bon.—Ent. Zeit. 26. Wien.
- — 1908: Fauna Germanica. I.—Stuttgart.
- Renkonen, O. 1938: Statistisch-ökologische Untersuchungen über die terrestrische Käferwelt der finnischen Bruchmoore.—Ann. Zool. Soc. Zool. Bot. Fenn. Vanamo. 6. Hfors.—F.
- Rensch, I. & B. 1932: Zur Landschneckenfauna von Nordskandinavien. Sitzber. Ges. Naturf. Freunde. Berlin.—S, N.
- Reuter, O. M. 1882, 1884, 1890: Entomologiska meddelanden från Soc. F. Fl. Fenn. sammanträden.—Ent. tidskr. 3. 5. 11. Sthlm.—F, R.
- Roger, J. 1856: Verzeichniss der bisher in Oberschlesien aufgefundenen Käferarten.—Zeitschr. f. Ent. 10. Breslau.
- Rolander, D. 1750: Skjut-Flugan.—K. Vet. Ac. Handl. 11. Sthlm.—S.
- Rosenhauer, W.G. 1842: Die Lauf- und Schwimmkäfer Erlangens.—Erlangen.
- Roubal, J. 1930: Katalog Coleopter Slovenska a Podkarpatska. 1.—Praha.
- — 1934: Die Coleopterenwelt der Treborer (Wittingauer). Moore.—Folia Zool. Hydrobiol. 7. Riga.
- Rüschkamp, F. 1926: 1. Nachtrag zu C. Röttgen, Die Käfer der Rheinprovinz.—Verh. Naturh. Ver. Preuss. Rheinl. u. Westf. 83. Bonn.
- Rye, B.G. 1906: Fortegnelse over Danmarks Biller. (Ent. Forening.)—Kbhvn. D.
- — 1908: Løbbebiller.—Danmarks Fauna. 3. Kbhvn.—D.
- Saalas, U. 1917, 1923: Die Fichtenkäfer Finnlands. I. II.—Ann. Ac. Sci. Fenn. (A). 8. 22. Hfors.—F, R.
- Sahlberg, C.R. 1834: Insecta Fennica. I.—Hfors.—F.
- Sahlberg, J. 1871 a: Entomologiska anteckningar från en resa i sydöstra Karelen sommaren 1866.—Notiser Sällsk. Fauna Fl. Fenn. 11. Hfors.—F.
- — 1871 b: Anteckningar till Lapplands Coleopter-Fauna.—Ibidem.—F.
- — 1873: Enumeratio Coleopterorum Carnivorum Fenniae.—Ibidem. Förhandl. 14.—F, R.
- — 1873–74: In Horae Soc. Ent. Ross. 10 (p. XII). Leningrad.—F.
- — 1874: In Notiser Sällsk. Fauna Fl. Fenn. 13 (p. 470). Hfors.—F, R.
- — 1880: Bidrag till Nordvestra Sibiriens Insektfauna. Coleoptera. I.—K. Vet. Ak. Handl. 17. Sthlm.
- — 1881, 1883, 1886 a, 1889, 1892, 1894 a, 1897, 1898: In Medd. Soc. Fauna Fl. Fenn. 6 (pp. 221, 261). 9 (p. 150). 13 (p. 176). 15 (p. 221). 18 (p. 153).

- 20 (p. 64). 23 (p. 46). 24 (p. 10). Hfors.—F, R.  
 — — 1882: Synonymiska anmärkningar till nordiska Coleoptera.—Ent. tidskr. 3. Sthlm.  
 — — 1886 b: In Medd. Soc. Fauna Fl. Fenn. 13 (p. 212). Hfors.—N, F.  
 — — 1887: In A.E. Nordenskiöld: Vegaexpeditionens vetenskapliga iakttagelser. 4.—Sthlm.  
 — — 1894 b: In Medd. Soc. Fauna Fl. Fenn. 20 (p. 64). Hfors.—S.  
 — — 1898: Catalogus praecursorius Coleopterorum in valle fluminis Petschora collectorum.—Horae Soc. Ent. Ross. 32. Leningrad.  
 — — 1900 a: Coleoptera nova vel minus cognita faunae fennicae.—Acta Soc. Fauna Fl. Fenn. 19. Hfors.—N, F.  
 — — 1900 b: Catalogus Coleopterorum Faunae Fennicae.—Ibidem.—F, R.  
 — — 1904: För Finlands fauna nya Coleoptera.—Medd. Soc. Fauna Fl. Fenn. 29 (1903). Hfors.—F.  
 — — 1913: En entomologisk november-exkursion vid Helsingfors.—Ibidem. 39.—F.  
 — — 1916: In Ent. M. Mag. 52 (p. 41). London.—F.  
 Sainte-Claire Deville, J. 1906: Catalogue critique des Coléoptères de la Corse. —Revue d'Ent. 25. Paris.  
 — — 1912: Die Verbreitung von Carabus glabratus Payk.—Ent. Blätter. 8. Berlin.  
 — — 1921: Sur un type de dispersion fréquent chez les coléoptères d'Europe. —Ann. Soc. Ent. Belg. 61. Bruxelles.  
 — — 1924: Kleinere Mitteilungen über die Dyschirius-Arten Europas.—Kol. Rundschau. 11. Wien.  
 — — 1930 a: Quelques aspects du peuplement des Iles britanniques.—Peupl. em. Iles Brit.—Soc. de Biogéogr. 3. Paris.—S, N, F.  
 — — 1930 b: Als die Nordsee noch trocken war — —. —4. Wandervers. Deutscher Ent. Berlin-Dahlem.  
 — — 1935, 1938: Catalogue raisonne des Coléoptères de France. —L'Abeille. 36. Paris.  
 Salmela, Katri 1938: Ekologinen tutkielma havuneulaskarikkeen kuovakuoriaiseläimistöstä Nousiaisissa.—Ann. Univ. Turk. (A) 6. Åbo.—F.  
 Sandegren, R. 1914: Ragundatraktens postglaciala utvecklingshistoria enligt den subfossila florans vittnesbörd. (Ahlmann, Caldenius, Sandegren). —Sveriges Geol. Unders. (Ca) 12. Sthlm.  
 Sandin, E.—Ein Manuskript über die Coleopteren der Gegend von Göteborg. Es wird im Naturhist. Mus. Göteborg aufbewahrt.†  
 Schatzmayr, A. 1907: Die Koleopterenfauna der Villacheralpe (Dobratsch). —Verh. Zool. Bot. Ges. 57. Wien.

†(Manuscript on the Coleoptera of the Göteborg region, which is being kept in the Natural History Museum of Göteborg; suppl. scient. edit.).



- — 1937: I *Calathus* d'Europa.—Publ. Mus. Ent. "Pietro Rossi". 2. Udine.—N.
- Schauberger, E. 1926–1932: Beitrag zur Kenntnis der paläarktischen Harpalinen. 1–8. Col. Centralbl. 1–5. Berlin.
- — 1933: Zur Kenntnis der paläarktischen Harpalinen. 13.—Kol. Rundschau. 19. Wien.
- Schaum, H. 1860: Coleoptera. I: 1.—In W.F. Erichson: Naturgesch. d. Ins. Deutschlands. I.—Berlin.
- Scheidt, C. v. 1919: Beiträge zur schlesischen Käferfauna.—Ent. Mitt. 8. Berlin-Dahlem.
- Schille, Fr. 1916: Entomologie aus der Mammut-und Rhinoceros-Zeit Galiziens. (Übersetz. d. poln. Arbeit, "Wykopaliska Starunskie" von A.M. Lomnick 1914).—Ent. Zeitschr. 30. Frankfurt a. M.
- Schiødte, J.C. 1841: Genera og Species af Danmarks Eleutherata. I.—Kbhvn.—D.
- — 1861: Danmarks Harpaliner.—Naturh. Tidsskr. (3) I. Kbhvn.—D.
- — 1870: Tillaeg til Danmarks Karaber og Dytisker.—Ibidem. 6.—D.
- Schneider, G.W. 1862: In Ent. Zeit. 23 (p. 325). Stettin.—N.
- Schneider, J. Sparre 1875: De i Søndre Bergenhus Amt hidtil observerede Coleoptera og Lepidoptera.—Christ. Vid. Selsk. Forh. Oslo.—N.
- — 1879 a: Entomologiske Undersøgelser i Bergenshus Amt.—Ibidem.—N.
- — 1879 b: Coleoptera iagttagne ved Tromsø og i nærmeste omegn.—Tromsø Mus. Aarsh. 2. Tromsø.—N.
- — 1883: Nogle zoologiske iagttagelser fra Varde.—Tromsø Mus. Aarsberetn. (1882). Tromsø.—N.
- Schneider, J. Sparre 1885 a: Nordfuglø, en zoologisk skizze.—Ibidem (1884).—N.
- — 1885 b: Mindre entomologiske meddelelser fra det arktiske Norge.—Ent. tidskr. 6. Sthlm.—N.
- — 1888: Dyrlivet på vore havskjaer. En zoologisk udflugt til Hillesø juni 1887.—Tromsø Mus. Aarsberetn. (1887). Tromsø.—N.
- — 1888–89: Oversigt over de i Norges arktiske region hidtil fundne Coleoptera.—Tromsø Mus. Aarsh. 11. 12. Tromsø.—S, N.
- — 1889: Entomologiske udflugter i Tromsø omegn.—Ent. tidskr. 10, Sthlm.—N.
- — 1894: Sydvarangers entomologiske Fauna. 1. Coleoptera.—Tromsø Mus. Aarsh. 16. Tromsø.—N, F.
- — 1895: En entomologisk udflugt til Bardodalen og Altevand i juli 1893.—Ent. tidskr. 16. Sthlm.—N.
- — 1898: Insektlivet i Jotunheimen.—Tromsø Mus. Aarsh. 19. Tromsø.—N.
- — 1899: Insektfaunaen paa Kvaløen.—Ibidem. 20.—N.

- — 1901: Coleoptera og Lepidoptera ved Bergen og i naermeste omegn.  
—Bergens Mus. Aarb. Bergen.—N.
- — 1903: Coleoptera insamlede af kand. Embr. Strand &c.—K. Norske Vid.  
Selsk. Skr. Trondheim.—N.
- — 1906: Sydhere, et litet bidrag &c.—Tromsø Mus. Aarsh. 27, Tromsø.—N.
- — 1910 a, 1912: Maalselvns insektfauna. I. Coleoptera.—Ibidem. 30. 33.  
—N.
- — 1910 b: Hillesø, et litet supplement.—Ibidem. 31, 32.—N.
- Schneider, O. & Leder, H. 1878: Beiträge zur Kenntniss der kaukasischen  
Käferfauna.—Verh. Naturf. Ver. 16 (1877). Brno.
- Schøyen, W.M. 1879: Supplement til H. Siebke's Enumeratio &c.—Christ. Vid  
Selsk. Forh. Oslo.—N.
- — 1879 b: Bidrag till Dovrefjelds og Gudbrandsdalens Insekt-  
fauna.—Nyt. Mag. f. Naturv. 24. Oslo.—N.
- — 1880: Coleopterologiske notitser.—Ent. tidskr. I. Sthlm.—N.
- Seidlitz, G. von 1872: Fauna Baltica.—I. Aufl.—Dorpat.—B.
- — 1891: Fauna Baltica.—II. Aufl.—Königsberg.—B.
- Semenov, A. 1898: Remarques sur les Coléoptères de la Russie européenne  
et du Caucase. I—L.—Bull. Soc. Imp. Nat. 12. Moskwa.
- — 1901: Bemerkungen über die Koleopteren, gefunden i. d. Jahre 1900  
in Umgebungen von Hungerburg. (Russisch.)—Revue Russe d'Ent. 1, 6  
(p. 300). Jaroslaw.—B.
- — 1904 a: Ibidem. 4 (p. 300). Leningrad.—R.
- — 1904 b: Analecta coleopterologica.—Ibidem.
- — 1906: Contribution à la faune de l'île Kolgujev. Coleoptera.—Horae  
Soc. Ent. Ross. 37. Leningrad.
- Siebke, J.H. 1853, 1863, 1866, 1870, 1873: In Nyt Mag. f. Naturv. Oslo.—N.
- — 1875: Enumeratio insectorum norvegicorum. II.—Univ.-progr. Oslo.—N.
- Sjöberg, O., s. Jansson.
- Sommerfelt, S.C. 1824–27: Physisk-oeconomisk Beskrivelse over Saltdalen i  
Nordlandene.—K. Norske Vid. Selsk. Skr. 2. Trondheim.—N.
- Sorauer, P. 1932: Handbuch der Pflanzenkrankheiten. 5 (4. Aufl.).—Berlin.
- Spaeth, Fr. 1899: Uebersicht der palaearktischen Arten d. Gen. Notiophilus.  
—Verh. Zool.-Bot. Ges. 49. Wien.—N.
- Speiser, P. 1910: Käferreste aus ostpreussischem Diluvium.—Jahrb. K. Preuss.  
Landesanst. u. Bergak. 31.2. Königsberg.
- Stenius, G. 1917: In Medd. Soc. Fauna Fl. Fenn. 43 (p. 116). Hfors.—F.
- — 1936: Beiträge zur Kenntnis der Coleopterenfauna im Kilpisjärvi-Gebiet.  
—Acta Soc. Fauna Fl. Fenn. 58. Hfors.—F.
- Stern, C. 1926: Die Käfer der Umgegend von Hamburg-Altona. Carabidae.  
—Verh. Ver. naturw. Unterhalt. 18. Hamburg.
- Storå, R. 1936: Calosoma denticollis &c.—Memor. Soc. Fauna Fl. Fenn. 12.  
Hfors.—F.

- — 1938: Beobachtungen über Meerestriftsinsekten in Tvärminne im Sommer 1936.—Ibidem. 14.—F.
- Storm, V. 1876, 1877: Aarsberetn. fra den zool. Samlings Bestyrer.—K. Norske Vid. Selsk. Skr. 8. Trondheim—N.
- Strand, Andreas 1935: De fennoskandiske former av *Carabus problematicus* Hbst.—Norsk Ent. Tidsskr. 4. Oslo.—S, N, F, R.
- Strand, Embrik 1898: In Ber. Naturw. Ver. (1896–1897). Regensburg.—N.
- — 1899, 1900 a: In Ent. tidskr. 20. 21. Sthlm.—N.
- — 1900 b: In Nyt. Mag. f. Naturv. (37). Oslo—N.
- — 1904: In Arch. Math. og Naturv. (B) 27. Oslo.—N.
- — 1923: Zur Coleopterenfauna Norwegens.—Arch. f. Naturgesch. 89, A 4. Berlin.—N.
- Strøm, H. 1765, 1768: Beskrivelse over Norske Insecter. I, II.—Det Trondhiemske Selsk. Skr. 3. 4. Kbhvn.—N.
- — 1781: Udkast til en Beskrivelse over Hardanger &c.—Kbhvn.—N.
- — 1783: Norske Insecters Beskrivelse.—Danske Vid. Selsk. Skr. (Nye Saml.). 2. Kbhvn.—N.
- — 1784: Physisk-Oeconomisk Beskrivelse over Eger-Praestegiaeld &c.—Kbhvn.—N.
- Suffrian, C.G.L.E. 1871: Synonymische Miscellaneen. XXXVIII.—Ent. Zeitung. 32. Stettin.—S.
- Sukatscheff, W. 1906: Über die Torfmoore des russischen Seegebietes.—Leningrad (Nach Henriksen 1933.)
- Sumakow, G.G. 1931: Beiträge zur Fauna der Coleopteren von Estland. Eesti Loodust. Arhiiv. (II) 13. (Acta Inst. et Mus. Zool. Univers.). Dorpat.—B.
- Sundelin, U. 1917: Fornsjöstudier inom Stångåns och Svartåns vattenområden.—Sveriges Geol. Unders. (Ca). 16 Sthlm.
- Sundevall, J.C. 1847: Om växtätande Carabici.—Öfvers. K. Vet. Ak. Förh. 4. Sthlm.—S.
- Székey, V. 1934: Revision der boreoalpinen Coleopteren auf vergleichend-anatomischer Grundlage.—Mat. és Termész. Értesítő. 52. Budapest.—N.
- Szeliga-Mierzeyewsky, W. 1937: Einige faunistisch neue oder seltene Insekten von der Insel Oesel (Estland).—Ent. Rundschau. 54. Stuttgart.—B.
- Tenenbaum, S. 1931: In Fragm. Mus. Zool. Pol. 1. Warszawa.
- — 1937: In Polskie Pismo Ent. 14–15. Lwow.
- — 1938: In Fragm. Mus. Zool. Pol. Warszawa.
- Thomson, C.G. 1851: Coleoptera, funna vid Ramlösa.—Öfvers. K. Vet. Ak. Förh. Sthlm.—S.
- Thomson, C.G. 1857: Skandinaviens Coleoptera, synoptiskt bearbetade. I (unvollendet).—Lund.—S.
- — 1859, 1867 a, 1868: Skandinaviens Coleoptera, synoptiskt bearbetade. I. IX. X.—Lund.—S, N.



- — 1867 b: Entomologiska anteckningar under en resa i Skåne 1866.  
—Öfvers. K. Vet. Ak. Förh. 24. Sthlm.—S.
- — 1869–1895: Opuscula Entomologica. I–XX.—Lund.—S.
- — 1883: In Bull. Ann. Soc. Ent. France. 63 (p. CXXI). Paris.—S.
- — 1885: Skandinavians Insecter, en handbok i entomologi. I; Coleoptera.  
—Lund.—S.
- Tonning, H. 1768: Rariora Norvegiae.—In: Linné, Amoenitates Academiae.  
7. Uppsala.—N.
- Trappen, A.v.D. 1929–30: Die Käfer.—Die Fauna von Württemberg.  
—Jahresh. Ver. vaterl. Naturk. Württ. 85. Stuttgart.
- Tschitschérine, T. 1903: Notice sur divers Notiophilus Dum.—Horae Soc. Ent.  
Ross. 36. Leningrad.
- Tullgren, A. 1912: Skadedjur i Sverige 1911.—Upps. i prakt. ent. (Bil. t. Ent.  
tidskr. 33). Uppsala.—S.
- — 1917: Skadedjur i Sverige åren 1912–1916.—Medd. 152 Centralanst.  
försöksväs. jordbr. Sthlm.—S.
- Uddman, J. 1753: Novae Insectorum Species. Diss.—Åbo.—F.
- Ulanowski, A. 1884: Z fauny coleopterologicznój Inflant polskich.—Sprawozd.  
Kom. Fizyogr. 18 (1883). Kraków.—B.
- Ullmann, A.C. 1896: Om nogle skandinaviske arter af Carnivorer.—Ent. tidskr.  
17. Sthlm.—N.
- — 1899: Norske fund af Coloptera.—Ibidem. 20.—N.
- Uyttenboogaart, D.L. 1909: Lijst van Coleoptera, verzameld in Dalekarlië  
(Zweden), Juli 1908.—Ent. Ber. 2. Haag.—S.
- — 1913 a: Lijst van Coleoptera, verzameld op den Kinnekulle (Zweden)  
in Juli 1912—Ibidem. 4.—S.
- — 1913 b: In Tijdschr. v. Ent. 56 (p. XVIII–XX). Haag.—S.
- Wahlgren, E. 1908: Bidrag till kännedomen om Öfre Klarälfdalens  
entomogeografi.—Ark. f. zool. 4. Sthlm.—S.
- — 1915, 1917: Det öländska alvarets djurvärld. I. II.—Ibidem. 9. 11.—S.
- Walker, J.J. 1891: In Trans. Ent. Soc. (Proceed., p. XXII). London.—N.
- Wallengren, H.D.J. 1866: Nordöstra Skånes Fauna.—Öfvers. K. Vet. Ak. Förh.  
Sthlm.—S.
- Weber, C. 1891: Ueber das Diluvium bei Grünenthal in Holstein.—Neues  
Jahrb. f. Miner. 62.2. Stuttgart.
- Weber, L. 1916: In Ent. Blätter. 12 (p. 223). Berlin.—N.
- Wegelius, A. 1907: In Medd. Soc. Fauna Fl. Fenn. 33 (p. 32). Hfors.—F.
- Wegrzecki, M. 1932: Koleopterologische Studien an der Ostseeküste.  
1.—Fragm. Mus. Zool. Pol. 1. Warszawa.
- Weissberg, St. 1924: In Ann. Mus. Pol. Hist. Nat. 2. Warszawa.
- West, Aug. 1930: Coleoptera.—In Zoology of the Faroes. Kbhvn.
- — 1940: Fortegnelse over Danmarks Biller.—Ent. Medd. 21. Kbhvn.—D.
- Westhoff, Fr. 1881: Die Käfer Westfalens.—Bonn.

- Wiepken, C.F. 1886: Nachtrag zu dem Systematischen Verzeichnisse der bis jetzt im Herzogthum Oldenburg gefundenen Käferarten.—Abh. Naturw. Ver. 9. Bremen.
- Wilken, C. 1867: Käfer-Fauna Hildesheims. (Schulprogr.)—Hildesheim.
- Wilse, J.N. 1779: Physisk, oekonomisk og statistisk Beskrivelse over Spydeberg Praestegjeld &c. I.—Oslo.—N.
- Wiström, J.A. 1871: Provinsen Helsinglands Macrolepidoptera. (Skolprogr.).—Hudiksvall.—S.
- Wolf, E. 1935, 1936, 1937, 1938: Beiträge zur Coleopterenfauna der Freiburger Bucht und des Kaiserstuhls. II. III. IV. V.—Mitt. Bad. Landesver. Naturk. (N.F.). 3. Freiburg i. Br.
- — 1939, 1940: Beiträge &c. VI. VII.—Mitt. f. Naturk. u. Naturschutz (N. F.). 4. Freiburg i. Br.
- Wuorentaus, Y. 1910: Alucelle Ostrobothnia borealis 236 uutta coleopteraa. —Medd. Soc. Fauna. Fl. Fenn. 37. Hfors.—F.
- — 1916: Ibidem. 42 (p. 21)—F.
- Zetterstedt, J.W. 1818, 1824: Några Nya Svenska Insect-Arter.—K. Vet. Ak. Nya Handl. Sthlm.—S.
- — 1822: Resa genom Sveriges och Norriges Lappmarker. I. II.—Lund.—S.
- — 1828: Coleoptera, Orthoptera et Hemiptera Faunae Insectorum Lapponicae.—Hamburg.—S, N, F.
- — 1833: Resa genom Umeå Lappmarker.—Örebro.—S.
- — 1840: Insecta Lapponica descripta.—Leipzig.—S, N, F.
- Zumt, F. 1931: Die Koleopterenfauna des Steppenheidebiotops von Bellinchen und Oderberg.—Beitr. z. Naturdenkmalpflege. 14. Berlin.

# List of Synonyms of Species and Genera

The two-letter abbreviations indicate genus names.

Acrodon, s. Amara  
Actedidium, s. Bembidion  
acuminata, Am. = eurynota  
Acupalpus, also see Stenolophus  
adustum, Be. = semipunctatum  
Aechmites = Pristonychus  
aeneus, Dy., s. auch Lüdersi  
aeruginosum, Be. = difficile  
aestuans, No. = pusillus  
Aëtrophorus, s. Demetrias  
affine, Be. = Stephensi  
affinis, Ha. = aeneus  
albipes, Ag. = ruficornes  
alpinus, Ca., s. melanocephalus  
Anchomenus, s. Agonum  
Anchus, s. Agonum  
Andreae, Be., s. auch femoratum  
    und ustulatum  
anglicus, St. = teutonius  
angusticollis, Ag. = assimilis  
angusticollis, Ha. = puncticeps  
angustus, El. = angusticollis  
Anthracus, s. Acupalpus  
arcensis, Ca. = arvensis  
arcticus, Pt. = fastidiosus  
arenosus, Dy. = thoracicus  
atratus, Br. = similis  
australis, Pa., s. septentrionis  
Balbii, Ne., s. Gyllenhali  
Balius, s. Acupalpus

basalis, Cy. = vaporariorum  
bifoveolatum, Ag. = ericeti  
bigeminus, No. = pusillus  
biguttatum, Be., s. auch aeneum  
Blechrus = Microlestes  
Blemus = Perileptus  
borealis, Pt. = adstrictus  
boreellus, Pt. = diligens  
Bothriopterus, s. Pterostichus  
Bracteon, s. Bembidion  
Bradytus, s. Amara  
brevicollis, Ha. = seladon  
brunnipes, Ac., s. auch dorsalis  
bruxellense, Be. = rupestre  
caelatus, Ch. = quadrisulcatus  
caligata, Am., s. alpina  
catenulatus, Ca. = problematicus  
celere, Be. = lampros  
Celia, s. Amara  
Chlorodium, s. Bembidion  
Chrysobracteon, s. Bembidion  
circumcinctus, Br. = similis  
cisteloides, Ca. = fuscipes  
clavipes, Pa. = assimilis  
Clibanarius, s. Agonum  
coerulescens, Lo. = pilicornis  
cognata, Am., s. alpina  
Colliurus = Odacantha  
complanata, Am., s. fusca  
concinnum, Be. = Andreae



concinnus, Pt. = madidus  
 contaminatum, Be. = transparentes  
 continua, Am., s. communis  
 contracta, Cl. = collaris  
 convexior, Am., s. communis  
 convexus, Cy., s. caraboides  
 cordicollis, Dr. = quadraticollis  
 crenatus, Pt. = vernalis  
 crenulatum, Be., s. auch Fellmanni  
 cruciatum, Be. = Andreae  
 curvicrus, Am., s. ovata und similata  
 cyanocnemis, Am. = curta  
 Cyrtotus, s. Amara  
 Daniela, s. Bembidion  
 degenerata, Ne. = salina  
 dentellum, Be., s. auch tinctum  
 deplanatus, Pt. = Middendorffi  
 Deutsch, Tr. = cognatus  
 Diplocampa, s. Bembidion  
 discoideus, Ha. = smaragdinus  
 dissolutum, Be. = Andreae  
 distinguendum, Be. = Siebkei  
 dorsalis, Ac., s. auch consputus  
 elongatum, Ag. = gracilipes  
 elongatus, Cy., s. caraboides  
 emarginatum, Ag., s. moestum  
 Emphanes, s. Bembidion  
 Epaphius, s. Trechus  
 erythropus, Pt. = strenuus  
 Eupetedomus, s. Bembidion  
 Europhilus, s. Agonum  
 excavatus, Pa. = atrorufus  
 fasciatus, No. = Reitteri  
 Feronia = Pterostichus  
 ferrugineus, Ha. = rufus  
 flammulatum, Be. = dentellum  
 flavescens, Ha. = rufus  
 flavicornis, Do. = halensis  
 flavipes, Ca. = erratus  
 formosa, Am. = nitida  
 foveola, Me. = foveatus  
 fulvipes, Ca. = erratus  
 fulvipes, Ha. = latus  
 fuscicornis, Am. = cursitans  
 fuscicrus, Be. = repandum  
 fuscus, Ca. = ambiguus  
 gemina, Am. = lucida

Genei, Be., s. Illigeri  
 gibbus, Dy. = globosus  
 gibbus, Za. = tenebrioides  
 glabratus, Mi. = minutulus  
 Gustavi, Di. = pubescens  
 Gyllenhali, Ac. = dorsalis  
 Güntheri, Am. = nitida  
 Güntheri, Be., s. velox  
 haemorrhous, Be. = unicolor  
 heterocerum, Be. = Stephensii  
 Hirmoplataphus, s. Bembidion  
 holosericeus, Ch. = tristis  
 honestus, Ha. = rufitarsis  
 humeralis, Ba. = sodalis  
 hyperboreus, Pa. = septentrionis  
 hypocrita, No. = Germinyi  
 iberica, Ne. = salina  
 Idiochroma, s. Agonum  
 ignavus, Ha. = rufitarsis  
 Illigeri, Ch. = costulatus  
 impressum, Be. = velox  
 Jakovlevi, El. = angusticollis  
 jensense, Be. = lapponicum  
 Klinckowströmi, Ne. = salina  
 Kodymi, Am. = littorea  
 Kolströmi, Be., s. prasinum  
 Laemostenus = Pristonychus  
 Lagarus, s. Pterostichus  
 lapidosus, Tr. = fulvus  
 Lasiotrechus, s. Trechus  
 laticollis, Tr. = Zetterstedti  
 leucophthalmus, Pt. = vulgaris  
 limbatus, Ha. = latus  
 Limodromus, s. Agonum  
 littorale, Be., s. auch ustulatum  
 livida, Am. = bifrons  
 Lophia, s. Bembidion  
 Lorocera = Loricera  
 luridus, Ac. = dubius  
 luteicornis, Ha., s. auch Winkleri  
 Lysholmi, Be. = dauricum  
 macropterum, Be. = scandicum  
 maderae, Ca. = auropunctatum  
 Mäklini, Ne. = Gyllenhali Balbii  
 Mannerheimi, Be. = unicolor  
 marinum, Be. = aeneum  
 melancholica, Am. = municipalis

melanocephalus, St. = skrimshiranus  
 melanocera, Am. = nigricornis  
 Metallina, s. Bembidion  
 micans, Ag., s. auch Thoreyi  
 minutus, Tr. = quadristriatus  
 multisetosus, Ha. = picipennis  
 municipalis, Am., s. auch cursitans  
 Natvigi, Am. = nigricornis  
 Neja, s. Bembidion  
 Nepha, s. Bembidion  
 nigripes, Be. = tinctum  
 nigritarsis, Ha., s. auch fuliginosus  
 norvegicus, Dy. = Helléni  
 Notaphus, s. Bembidion  
 notatus, Dr., s. nigri ventris  
 nubigena, Ca., s. melanocephalus  
 oblongum, Ag. = obscurum  
 obscurum, Ag., s. auch viduum  
 obsoleta, Am. = ovata  
 oculata, Am. = cursitans  
 Ocys, s. Bembidion  
 olivaceum, Be. = prasinum  
 Omaseus, s. Pterostichus  
 Ophonus, s. Harpalus  
 oreophilus, Tr., s. Mannerheimi  
 Oreoxenus, s. Trichocellus  
 paludosum, Be. = litorale  
 Palméni, Be. = Fellmanni  
 paludosus, Tr. = rubens  
 palustris, No., s. auch Germinyi  
 parallelepipedus, Ab. = ater  
 Paraprincipidium, s. Bembidion  
 parcepunctatus, Ha. = seladon  
 Pardileus, s. Harpalus  
 parumpunctatum, Ag. = Mülleri  
 parvicolle, Be. = hirmocoelum  
 patricia, Am. = equestris  
 pauciseta, Pt. = coerulescens  
 pelidnum, Ag. = micans bzw. Thoreyi  
 Percosia, s. Amara  
 petrosum, Be. = Siebkei  
 Peryphus, s. Bembidion  
 Pfeiffi, Be. = virens  
 Phila, s. Bembidion  
 Philochthus, s. Bembidion  
 picicornis, Pa. = septentrionis  
 picipennis, Ha., s. auch vernalis

picipes, Ag. = piceum  
 planus, Sp. = leucophthalmus  
 Plataphodes, s. Bembidion  
 Plataphus, s. Bembidion  
 Platynus, s. Agonum  
 Platysma, s. Pterostichus  
 Poecilus, s. Pterostichus  
 polonicum, Be. = Andreae  
 ponojense, Be. = crenulatum  
 ponojensis, Tr. = Mannerheimi  
 Porotachys, s. Tachys  
 prasinum, Ag. = dorsale  
 Principidium, s. Bembidion  
 Procrustes, s. Carabus  
 properans, Am. = cursitans  
 pseudoaeneus, An. = poeciloides  
 Pseudophonus, s. Harpalus  
 pseudoproperans, Be. = dauricum  
 psittacinus, Ha. = distinguendus  
 puellum, Ag. = Thoreyi  
 puncticeps, Pt. = cupreus  
 punctulatus, Ha. = punctatulus,  
 pusillum, Be. = minimum  
 pygmaeus, Cy., s. caraboides  
 quadriguttatum, Be. = Illigeri  
 quadripustulatus, Pa. bipustulatus  
 quadrisulcatus, Ch., s. auch costulatus  
 quatuordecimstriatum Be. = properans  
 Rathkei, Tr. = fulvus  
 rectangulus, Ha. = Melleti  
 rostratus, Cy., s. caraboides  
 rotundicollis, Ca. = piceus  
 rubripennis, Pa. = septentrionis  
 rufescens, Be. = harpaloides  
 rufescens, Ne. = Gyllenhali  
 rufibarbis, Ha. = schaubergerianus  
 ruficornis, Ha. = pubescens  
 rufipes, Be. = nitidulum  
 rufipes, Ha. = pubescens  
 rufocincta, Am. = praetermissa  
 Sahlbergi, Be. = Grapei bzw. Schüppeli  
 sahlbergioides, Be. = grapeioides  
 Sarsi, Am. = ovata  
 Schneideri, Dr. = marginellus  
 Schneideri, Ne., s. Gyllenhali Balbii  
 scitulum, Ag., s. auch micans und  
 Munsteri

Semicampa, s. Bembidion  
 sericeum, Ca. = auropunctatum  
 seriepunctatus, Ha. = quadripunctatus  
 setiporus, Tr. = Mannerheimi  
 sibirica, Ne., s. livida  
 sibiricus, Ca., s. melanocephalus  
 silvicola, Am., s. Quenseli  
 simulans, Am. (Ha.) = peregrina  
 spinipes, Am. = aulica  
 strenuus, Pt., s. auch diligens  
 striola, Ab. = ater  
 Sturmi, Be. = octomaculatum  
 subcyaneus, Pr. = terricola  
 subpunctatus, Ha. = seladon  
 subsulcata, Am., s. alpina  
 sulcicollis, Ch., s. auch quadrisulcatus  
 Tachypus = Asaphidion  
 Taphria = Synuchus  
 tardoides, Ha. = serripes  
 tarsalis, Ca., s. melanocephalus  
 tenellum, Be. = azurescens  
 Testedium s. Bembidion  
 Tetraplatypus. Bradycellus  
 Théeli Pt. = Middendorffi

Thomsoni, Ac. = dorsalis  
 thoracica Ne., s. livida  
 transversicollis, Tr. = Zetterstedti  
 Trechoblemus, s. Trechus  
 Trepanedoris, s. Bembidion  
 Trepanes, s. Bembidion  
 Triaena, s. Amara  
 trivalis, Am. = aenea  
 tumida, Am. = peregrina  
 uliginosum, Ag. = Krynicki  
 unicolor, Dy. = Lüdersi  
 unipunctatus, De. = monostigma  
 ustulatum, Be., s. auch varium  
 vaporariorum, St. = teutonus  
 Wasastjernae, Pt. = strenuus  
 velox, Be., s. auch properans  
 versicolor, Pt. = coerulescens  
 vespertinus, St. = mixtus  
 vitreus, Pt. = adstrictus  
 vivalis, Sy. = nivalis  
 vulgaris, Am. = famelica bzw.  
 lunicollis  
 Zezea, s. Amara.















